A Guide to Technical Careers

To help develop, produce and market the advanced information processing technologies and products of the future, IBM needs engineers and scientists in a wide range of disciplines. The information contained in this Guide is intended to provide data about technical career opportunities with IBM. If you are interested in a career with IBM and welcome challenge and the rewards that go with it, speak to your IBM recruiting representative.

*See p. 3 for list of specific assignments.
**See p. 5 for list of locations.

Shown here are typical assignments by major academic discipline. This matrix is intended to give you an idea of work assignment possibilities for your academic discipline. By no means are they all-inclusive. Disciplines such as aeronautical engineering, human factors engineering, industrial design, psychology, engineering science and others are also utilized at certain IBM locations.

A description of each assignment can be found on the page indicated in the right-hand column of the matrix.

Typical Assignments	Ceramic Engineering	Chemistry and Chemical Engineering	Computer Science and Computer Engineering	Electrical Engineering	Industrial Engineering and Manufacturing Engineering	Materials Science	Mathematics and Statistics	Mechanical Engineering	Metallurgy and Metallurgical Engineering	Physics	Page Number
Acoustics				●		●		●		●	10
Application Programming			●	●			●				10
Computer Aided Design			●	●				●			13
Display Technology	●	●		●		●		●	●	●	13
Electronic Communications			●	●							13
Electronic Design			●	●						●	13
Electronic Packaging	●	●		●	●	●		●	●	●	14
Facilities Engineering		●		●	●			●			14
Human Factors Engineering			●	●							14
Industrial Engineering					●		●				14
Language Programming			●	●			●				17
Lithography Technology		●	●	●		●	●	●	●	●	17
Magnetic Recording	●	●		●		●		●	●	●	17
Manufacturing Engineering	●	●	●	●	●	●		●	●	●	17
Materials Development & Analysis	●	●				●			●	●	18
Materials Management			●		●		●				18
Mathematical Analysis			●				●				18
Mechanical Design						●		●		●	18
Mechanical Packaging						●		●	●		21
Microcode Development			●	●							21
Optics				●				●		●	21
Printer Technology		●		●		●		●	●	●	21
Process Engineering	●	●		●		●	●	●	●	●	21
Product Test & Assurance		●	●	●		●	●	●	●	●	22
Quality Engineering	●	●	●	●	●	●	●	●	●		22
Reliability, Availability, Serviceability			●	●				●		●	22
Semiconductor Design	●	●				●	●		●	●	22
Software Engineering			●				●				25
System Architecture & Analysis			●	●			●	●			25
Systems Programming			●	●			●				25
Technical Publications			●	●				●			25
Test Equipment Design			●	●				●			26
Thermal Analysis		●				●	●	●		●	26

Shown here are major academic disciplines used by IBM plant and laboratory locations. This matrix is intended to give you an idea of location possibilities for your academic discipline. By no means are they all-inclusive. Disciplines such as aeronautical engineering, human factors engineering, industrial design, psychology, engineering science and others are also utilized at certain locations.

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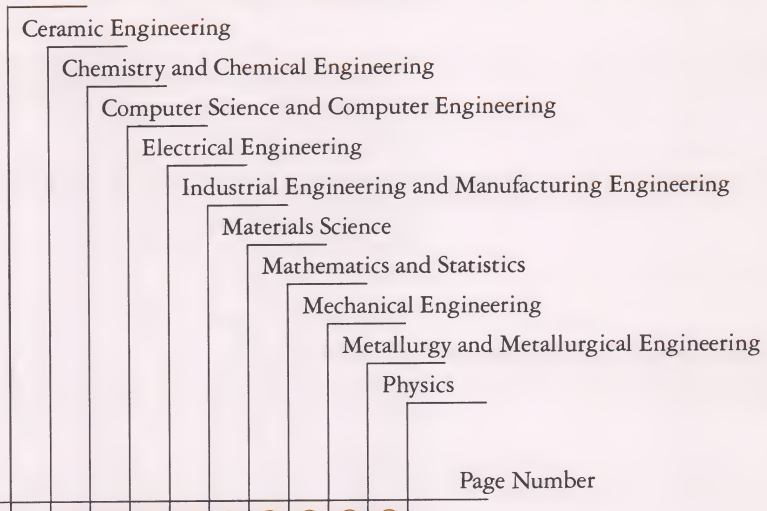

IBM Locations	Page Number
Austin, TX	28
Boca Raton, FL	29
Boulder, CO	30
Brooklyn, NY	32
Burlington, VT	33
Cambridge, MA	35
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East Fishkill, NY	39
Endicott, NY	41
Gaithersburg, MD	43
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Kingston, NY	45
Lexington, KY	47
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Manassas, VA	49
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Palo Alto, CA	53
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Sterling Forest, NY	63
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Information technology

The business of IBM is information technology—and that business is expanding. We live at a time when information has increasingly become one of the world's most valuable resources. If you are considering a career in this industry, we would like you to seriously consider a career with IBM. Your work at IBM will bear directly on a wide range of products—from computers to typewriters—all designed to help record, process, communicate, store and retrieve information.

In the forefront

IBM is an innovative, modern developer and manufacturer of computers and computer-related systems and products, the acknowledged leader of the industry. We have actually been at the forefront of the information business since 1911. In those days, we were known first as the Computing-Tabulating-Recording Company and later, in 1924, as the International Business Machines Corporation. Under the guidance of the late Thomas J. Waston, Sr., who served as president (and later chairman) for some 40 years, IBM became a recognized leader in accounting machines, electric typewriters, and early versions of computers (then known as electronic calculators).

Today, IBM's most powerful computers can perform millions of instructions a second. The company has become widely regarded as the leader in the field of information processing. IBM systems are used around the world to conserve power, maintain inventories, check out groceries at supermarkets, make plane reservations, forecast weather, handle bank transactions, assist medical research, process aircraft information for flight controllers—and in hundreds of other applications. IBM computers and programs have helped NASA monitor and control every manned United States space flight, from the first moon shots to the most recent Space Shuttle mission.

. . . and in the office

Another major area of the company's business involves more productive office systems. Products such as electric, electronic and magnetic media typewriters, text processors, copiers and printers improve the effectiveness of business communications in almost every function of today's modern office. Electronic document distribution is an emerging element in the office evolution, permitting timely point-to-point transmission of documents.

Individual performance is key

This kind of business—dynamic, growing, farseeing—is built on the performance of individuals like yourself working together to meet the technological needs of a society more and more dependent on information for survival and progress. We live in the age of information, and we are at the dawn of a new threshold of information technology. At IBM, opportunities are exploding for innovative and farsighted people willing to step up to challenge. Today, there are thousands of IBMers employed at 21 plants in the United States and 23 in 15 foreign countries—as well as 25 laboratories worldwide—engaged in research, development and manufacturing.

The performance of these men and women around the world has helped give IBM its long-standing reputation for leadership in the fast-growing industry of information technology.

Exciting technologies

Career opportunities at IBM are as varied as the company itself and the number of areas IBM is involved in. IBM technologies range from analysis of natural language to Very Large Scale Integration (VLSI), from image processing to laser-fiber optics. IBM is currently exploring:

Application of computation to non-numerical problems
Programming languages
Machine recognition of continuous human speech
Advances in microcircuitry
Experimental data management systems
Hardware imaging systems
High-speed signal processors
Word recognition and synthesis
Computer controlled instrumentation
Electron-beam technology
Robotics
Satellite transmission
Network architecture
Display technology
Man/machine interface

...and many more areas. Many of these technologies will emerge in the years ahead and help transform society.

A demanding environment

That's where you come in. To help make that future, we need engineers and scientists in a wide variety of disciplines. Career opportunities are available in technology and product development, manufacturing and research for people with degrees in electrical engineering, mechanical engineering, industrial engineering, chemical engineering, computer engineering and materials science. Opportunities are also available for mathematicians, physicists, chemists, computer scientists and in many other engineering and scientific disciplines.

IBM is a demanding, competitive place to work, with a variety of challenging career opportunities. You will have a chance to participate in new technologies. You may be involved in the development of hardware or software for many different types of products or systems. You will be constantly stimulated, constantly helping us develop and manufacture products and systems for all industries.

If you welcome this kind of environment, IBM offers plenty of room to grow—both personally and professionally—and every chance to stand out, to be recognized and to be rewarded.

Respect for the individual

One of IBM's most abiding beliefs is respect for the individual—respect for the integrity and rights of each person. IBM, as an equal opportunity employer, has moved aggressively to assure that women and minority group members, as well as handicapped individuals and veterans, not only have equal access to employment but also get equal consideration for advancement.

Two career paths

There are two paths for advancement open to technical people. Some of our programmers, engineers and scientists become managers, which means they spend most of their time managing people and technical projects. Others advance in purely technical ranks, following a professional path in which they devote their energies to specific professional tasks.

John Dickol, a BS in Electrical Engineering from Lehigh, is in test equipment engineering with IBM in East Fishkill, New York.

"This is an exciting department to be in. We design and develop equipment to test electronic components. My project is the high-speed digital receiver for one of our testers. The challenge is trying something that's never been done before.

"My boss told me what had to be done and he told me where I could get help if I needed it. And then I was on my own. A lot of what we do here has never been done before—in this department, we're often exploring unknown territory.

"Now I'm going to school part time to get a master's degree. That's one of the terrific things about IBM, they want you to keep learning and growing. It's good to know that if you want to keep your education up-to-date, IBM is behind you all the way."

"They gave me a large part of the responsibility for the project I'm working on, and it's one of the more important parts."

It is not uncommon for some people to advance both ways. They serve as managers for a while, then switch to professional work, then switch back again to management. Such options help IBMers enjoy more exciting careers.

Career opportunities for engineering and scientific disciplines at IBM fall into several major categories. Within each category is a wide variety of specific jobs. To help you evaluate your opportunities, these major categories and a number of jobs are described briefly here.

Developmemt

IBM's product development laboratories employ the largest group of technical professionals within the company. They are responsible for the planning and creation of new and improved IBM products for information handling systems and equipment. Working in dedicated small teams, highly qualified professionals develop improved products by innovatively advancing the state-of-the-art in technologies, engineering and programming and by applying these advances to the needs of our customers in an expanding and complex marketplace.

The development organization is responsible for managing a product from conception till the end of its marketing life. During the life cycle, development carries a product through the design phase, releases it to manufacturing, releases it to marketing for announcement, guarantees its performance in the customer's office and works on cost and reliability improvements. Challenges and opportunities provided by these responsibilities require the application of technical skills and ingenuity not only to innovate, but to also recognize and define technical problems, recommend technical alternatives, and carry out subsequent engineering and scientific solutions on IBM systems, products, programs and processes.

Manufacturing

The challenge in manufacturing is to produce quality, advanced-technology products in high volumes at practical cost. This involves extensive technical work in manufacturing technologies, materials processes, instrumentation, testing, computer control, robotization and process analysis. The manufacturing professional is involved with development, customer service and the entire production process. To insure a high quality product, manufacturing interacts closely with the marketplace in support of early product delivery and in maintaining tight control of all aspects of quality. Opportunities in manufacturing range the entire spectrum of engineering and scientific skills and include technical and business management skills.

Marketing

A marketing career in IBM is based on the premise that the proper solution to the customer's problem will provide the best application for IBM products. Marketing personnel are therefore extensively trained in applications of information processing and office systems technology and given a thorough foundation in business processes used by customers. An IBM marketing experience exposes the professional not only to the breadth of the IBM product line and its sophisticated and advancing technology but to customer executives

and the problems and issues faced by the leaders in American industry and government. Upon joining the company, IBM marketing representatives undergo extensive education programs to prepare them for this work. Because of the background, training and quality of IBM marketing people, and the nature of their job, IBM marketing representatives have unequalled access to customer and IBM executives and an opportunity to learn and grow from this involvement. For more information on marketing careers in IBM, speak with your IBM marketing recruiting representative.

Research and advanced technology

Advanced technical careers in IBM range from a variety of projects in basic science and advanced technology to many areas of development and manufacturing support. Research at IBM has three chief goals; to maintain a strong program in basic science, contributing to and drawing from the international world of science; to push present technologies toward their limits; and to explore alternative technologies to those presently in use. Challenges are diverse, from work on new concepts and development of new tools and methods to modelling of complex processes and automation of sophisticated design methods.

Typical assignments

Within each of these broad categories is an endless variety of specific jobs. The following are brief descriptions of over 30 typical assignments for recent graduates. These descriptions are not all-inclusive. Assignments at IBM are as varied as the company itself and its people. Moreover, some jobs are obviously more specialized than others—like acoustics and thermal analysis—while a number cover more major functional responsibilities such as system programming and electronic design. Whatever the area, IBM professionals work individually or on a small project basis, finding constant challenge and involvement in the latest technologies.

Acoustics

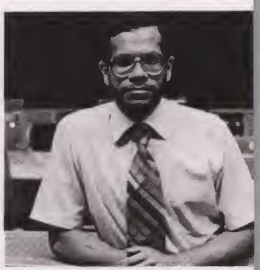
Acoustical analysis facilities available at IBM product development locations are used for the measurement, analysis and design of low-noise IBM products. IBM engineers study techniques for noise reduction at the source as well as methods for controlling sound transmitted as structure-borne and air-borne energy. They plan and implement acoustic noise tests, and develop and apply mathematical acoustic noise models. They use modern digital signal processing techniques to analyze materials used as sound absorbers.

Acoustical laboratories are well equipped with modern acoustical instrumentation, including sound and vibration transducers, spectral analyzers and digital signal processing equipment. IBM makes wide use of computer-aided data acquisition and analysis equipment. Engineers and scientists also work to advance the state of noise control technology. IBM supports research in advanced noise control techniques at several leading universities in the U.S.

Applications programming

Applications programming—the writing of computer instructions to do specific jobs—involves all phases of program development for new

"I was a member of the team responsible for the verification of the software that lit the space shuttle's main engines and put her into orbit."



Ben Flores, BS, Aeronautical Engineering, California Polytech State University; MS, Mechanical Engineering, University of California, Berkeley; IBM, Houston, Texas.

"I was in flight software support in Mission Control watching how the software would work and it did work —Columbia tracked like a bat. It was an awesome experience, knowing that I'd had an important role in this flight.

"That's the thing about IBM—they give you responsibility right from the start, all you can handle. And then they recognize performance with awards and raises and promotions. I've had my share of all three in my three years with IBM.

"When I first came to IBM I didn't know anything about managing people. You learn by watching, and you see how the managers honestly care about each person, about helping people shape their careers and use their abilities. If you want to go to a company that cares about its people and rewards your performance and encourages you to be original, IBM's the company you're looking for."

James Caldwell earned his bachelor's degree in Mechanical Engineering at RPI and a Ph.D. in Management Science and Operations Research at the University of Texas. Then he joined IBM in Austin, Texas. Jim is physically handicapped.

"The beauty of IBM is that they don't believe that disabilities have anything to do with such things as promotions and responsibilities. All they care about is whether you're qualified for the job that needs filling.

"Our group's assignment is putting in the computer systems that will run a new printed circuit plant. It's a big undertaking, and I have a large part of the responsibility.

"When I look back on my experience with IBM, my only regret is that I didn't come here sooner. This company is simply astonishing. I'm sure that if they found a way to guarantee love and affection, they'd do it."

"It's hard to imagine how any company could be more helpful in providing an equal career opportunity for all employees."

and enhanced applications products, from specifications through field support. IBM develops many program products that either solve customer problems directly or provide customers the means to efficiently develop their own solutions. Many application programs also help support internal operations at IBM, one of the largest users of its computers. Applications programming typically involves technologies such as requirements definition, application analysis, multiprocessing and multiprogramming design, distributed data processing, human factors, software recovery, data base integrity, correctness, testing and verification.

Computer-aided design

Engineers at all degree levels work with computer-aided design (CAD) systems in IBM. Recent graduates work on computer graphic systems to detail logic functions, analyze mechanical and thermal stresses, design assemblies and subassemblies, simulate linkage and other kinematic problems, verify logic designs, generate fault detecting test patterns and lay out chips, cards and boards. In higher levels of design, more advanced systems help outline requirements for new functions to be performed by electrical, logical or mechanical assemblies.

Display technology

Today's major interface between users and data processing applications is the display workstation. Display technologists (an interdisciplinary team of physicists, chemists, process engineers, electrical engineers and mechanical engineers) are concerned with electrical and optical devices such as cathode-ray tubes, liquid crystals, gas plasma panels, light-emitting diodes and electroluminescent transducers. Responsibilities include the developing of materials, the creation of device structures and the engineering of electronic drive systems. A significant ongoing effort helps IBM improve CRT image quality, minimize overall physical size while increasing screen content, improve phosphors and design more efficient deflection yokes.

Electronic communications

Electronic communications involves work in transmission design, communication system design and communication system analysis. Recent graduates investigate, evaluate and select design parameters for the overall design of communication links between computers. Besides making the selection of media, coding and protocols, they build analytical models, design transmission devices, select technologies and build and test the transmission link.

In communication systems design, engineers and computer science graduates design and develop systems to provide computer-to-computer communication. Using analytical and simulation models, professionals in communication system analysis determine performance bottlenecks and recommend alternate designs to improve system performance.

Electronic design

Working on the forefront of technology, electronic design engineers develop a variety of products and processes basic to IBM technology.

Within broad objectives, they plan programs, define approaches and conduct experiments in such areas as digital and analog circuit design, processor and input/output device design, LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) components, power systems and servo-mechanism design, tools and test systems. At many locations, IBM's Engineering Design System (EDS) supports design of the full range of IBM products, from large computer systems to microprocessor chips. EDS is often the electronic designer's most important design tool.

Electronic packaging

In this area, engineers and scientists continually look for innovative ways to interconnect electronic elements to provide the most function at the lowest cost. The work spans all levels of packaging, from chip to module to card and board. It includes areas such as power systems component placement and routing of signal cables. Leading edge technologies such as Multi-Layer Ceramics (MLC) are used. Challenges are found in all areas of the work, including the analysis of signal propagation speeds, heat transfer and electronic noise interferences.

Facilities engineering

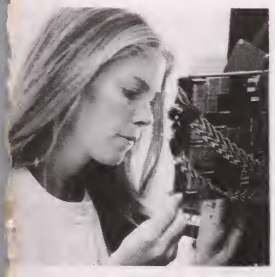
This area is responsible for the planning, engineering and construction work needed to provide functional, safe and economical operation of an IBM site. Recent graduates prepare studies, plans, designs and estimates for projects ranging from major powerhouse equipment to manufacturing line support and services. They plan, design and often install computerized material-handling systems, production equipment, energy management and new product support hardware. They also design electrical facilities and pollution control systems. Other responsibilities range from space planning, layout and materials handling to plans for providing bulk chemicals to manufacturing processes and new methods to reclaim, recycle and reuse chemicals.

Human factors engineering

Ease of use in a product is essential to IBM's commitment to quality. The human factors professional in IBM represents the end user of IBM products, designing and developing the man/machine interface. People in this area must communicate user requirements and participate in the development process—making recommendations, consulting with development engineering, specifying application guidelines and performing technology evaluations. They also design and execute appropriate tests to validate a product's usability. Activities include preparation and analysis of product requirement surveys and research on subjects such as visual fatigue, natural language programming and video display formats. Besides the development of new hardware and software products and systems, human factors professionals get involved in manufacturing processes, maintenance methods, publication, safety and applied research.

Industrial engineering

Industrial engineering at IBM calls for new ideas and problem solving in manufacturing processes. Industrial engineers must understand



Jean Wingler worked summers at IBM while earning her bachelor's in Electrical Engineering at Georgia Tech.

When she got her degree, Jean went to work for IBM in Boca Raton, Florida. She joined a team of 9 people who were developing an interface attachment for high speed data transfer and additional processing.

"To get me on board and bring me up to speed, I was assigned to develop the user's manual. This made me familiar with all aspects of the project, particularly from the customer's point of view.

"Now I'm developing programs to test our interface attachment in the lab. It's exciting, demanding work, and it puts me in touch with people all through IBM. You certainly do get plenty of visibility in this company. I figure my potential is just about unlimited.

"This has been a time of real growth for me, professionally and personally. I'm learning to work with people and to get my ideas across. And in a company like IBM, where ideas and innovation are so welcome, being able to express ideas is a must."

"Less than a year with IBM and I have already made a contribution to an invention disclosure. This company sure knows how to give recognition."

"The thing I'm impressed by is how the managers take a real interest in advancing your career."

Christine Comins has a BS in Computer Science from M.I.T. and is a member of the design technology group at IBM's laboratories in Poughkeepsie, New York.

"I worked for another company before joining IBM," Chris says, and they weren't using my technical abilities. But here at IBM there are many areas where my technical background can be used.

"IBM managers really care. For example, while I'm now working mainly on software, my manager knows I'm interested in getting into hardware design, too. He's helping me plan my assignments to give me experience in that area.

"And to make sure that people can qualify for new assignments in other parts of the company, IBM has all sorts of educational programs. I plan to go for my master's under the Graduate Work Study program—they even give you time off during the day to attend classes. How accommodating can a company be?"

sophisticated manufacturing processes and the complex interrelationship of people, materials, products and process variables. They play a vital role in estimating resource requirements, costs, availability and utilization. In preparing short and long term plans, recent graduates help estimate and project labor hours, manpower, space, material handling, physical layout and product cost through the program life cycle. Creative use is made of operations research techniques and business case studies to increase productivity and cost-effectiveness. Efforts not only span today's manufacturing environment but also help prepare facilities for the future, when new products and processes will be introduced.

Language programming

Language programming involves the development of new programming languages and state-of-the-art improvements to existing languages, including languages supported by IBM for each of its operating systems. It also involves the creation of language processors such as compilers and interpreters for interactive and batch use. Skilled in theory and implementation, language programmers search for improvements that will enhance the usability of languages for programmers worldwide. They work with language design, formal syntax and semantics, parsing, algorithms, computer optimizing techniques and compiler generation.

Lithography technology

Continuing advances in microelectronics are paced by lithography—the definition of circuit devices and interconnections in thin film heads and structural materials that make up the semiconductor wafer. This involves the development of resist systems comprised of polymers, photoactive compounds, solvents and developers as well as their formulation, synthesis, analysis, manufacturing/procurement and release to manufacturing. They apply new resist materials and tools to advanced product needs and develop model processes for system interaction and optimum trade-off points.

Recent graduates also apply advanced measurement tools to microelectronic needs, develop new tools where required (e.g., optical laser scanners and detectors, laser interferometers, Electron-Beam systems), and develop analytical models and computer systems to predict performance and extract/analyze data.

Magnetic Recording

This technology is the basis for computer storage in today's disk, tape and mass storage devices. Advances in storage capacity continue to be made through technical innovation and development in the areas of mechanical and electrical design and analysis, tribology, magnetic materials, polymers, thin film technology, and manufacturing processes. This multi-discipline technology involves the design, development and manufacture of recording systems and of the recording head, disk and tape components used in recording systems.

Manufacturing engineering

The direct technical link between development and manufacturing, IBM manufacturing engineers look at functional specifications and customer requirements in terms of how a product can be fabricated at the highest quality for the lowest

price. Employing advanced technologies, they design, develop and implement a variety of manufacturing processes and methods. Wide use is made of robotics and automatically programmed production equipment. Work includes the preanalysis of products to be manufactured, definition of tools, process, assembly and testing, design of on-line monitoring systems, development of inventory and shop floor control systems, development of operating plans and technical support to vendors.

Materials development and analysis

The physical and chemical properties of materials and the ways they are influenced by various processing techniques are basic to IBM technology and product development. Materials development work involves thin film metallurgy, thin film insulation, interfacial adhesion, high temperature chemistry, plasma chemistry, surface chemistry, electrochemistry and solid state diffusion. Other areas of interest include polymers, ceramic materials, alloys, ink formulation and organic coating formulation.

Materials analysis laboratories also play a vital role. A wide range of instrumental techniques are used including optical X-ray and electron spectroscopy, NMR (Nuclear Magnetic Resonance), mass spectroscopy, and electroanalysis, together with other microchemical and metallurgical procedures. ESCA and AUGER spectroscopy plus some of the most current advanced analytical techniques are used. Much of the work involves analysis of surfaces and trace impurities as well as chemical, structural and physical analysis of bulk inorganic and organic materials.

Materials management

Manufacturing products on the leading edge of computer technology requires new and innovative logistics and planning systems. Supply and demand of raw materials, parts and finished products must be balanced to meet goals of quality, delivery and cost. Systems analysts in materials management help develop and implement management information and application systems as well as a variety of measurement, forecasting and planning tools.

In production control, recent graduates help plan and order the raw materials, commodities and parts needed to support manufacturing and develop internal production schedules. Ongoing responsibilities include order entry, inventory management, implementation of engineering changes and expediting of critical parts. Sophisticated Materials Requirement Planning (MRP) and Manufacturing Activity Control systems are used.

Mathematical analysis

In this area recent graduates help design, develop and apply a variety of mathematic models and simulators, using techniques such as static and kinematic modeling. Mathematical analysis is used to evaluate heat transfer, acoustic, shock and vibration, circuit, fluid dynamic, pneumatic, error propagation, computational performance, data flow and control characteristics of electronic and electromechanical systems. IBM professionals also design, develop and evaluate algorithms for signal and data processing applications.

Mechanical design

Engineers in this area get involved in static and dynamic mechanical design of electronic units, opto-

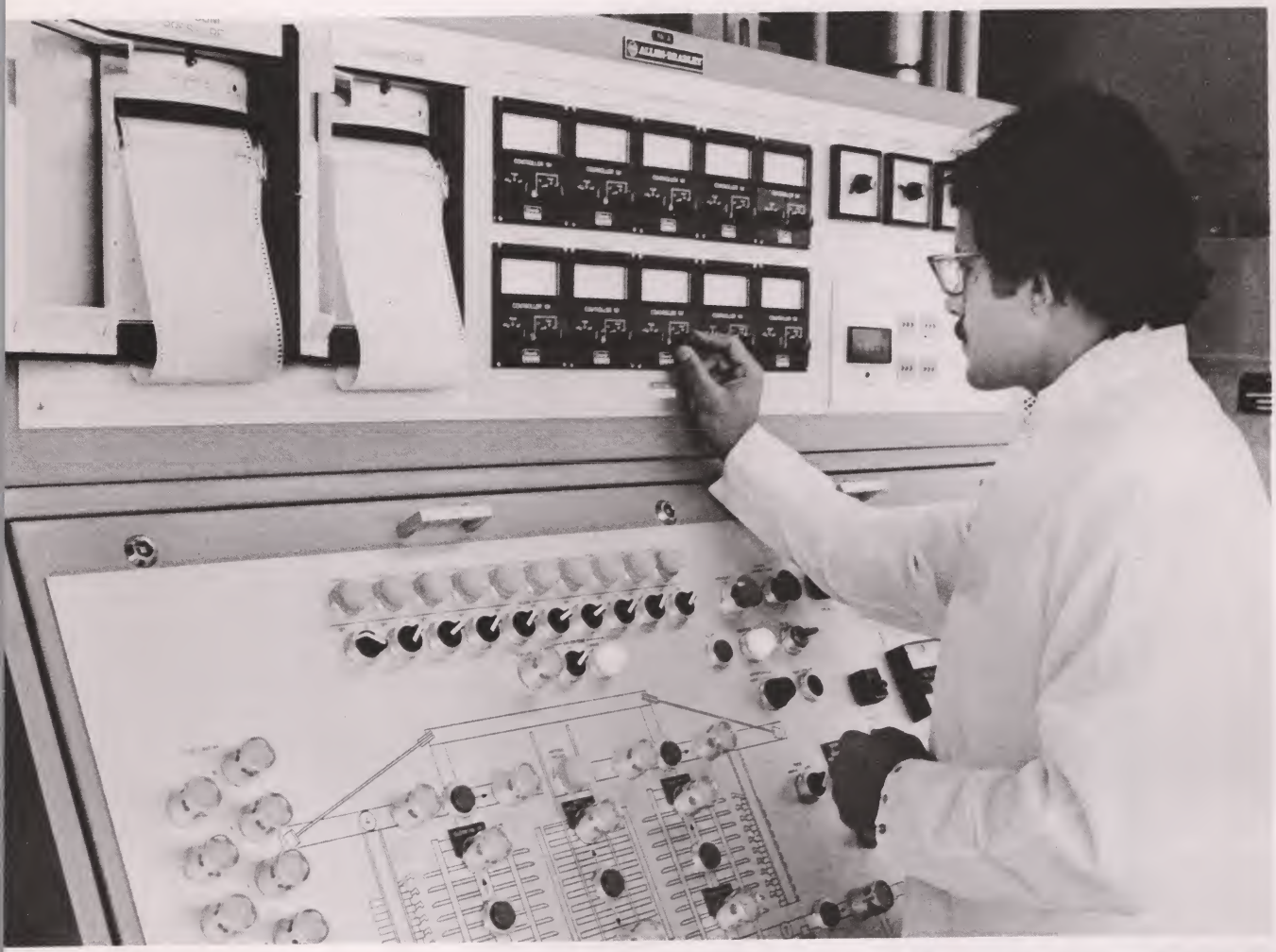
Lawrence Zaino has a BS in Computer Science from RPI and a master's in Electrical Engineering from Cornell. He works in performance analysis at the IBM laboratories in Poughkeepsie, New York.

"We're creating a model of a computer in software to see how it will perform before it's even built. It's exciting work, and I'm on my own—though it's easy to get help if I get stuck. And I must be doing well because I was promoted after only eight months. That's a great thing about IBM—they want you to make good.

"And they want you to get ahead. Right now, for example, I'm going for an MBA at Union College so I get out of work early to attend classes. I want that degree and IBM wants me to have it, too.

"IBM is a company I'd recommend to anybody who's smart and who wants to use his brains and imagination."

"I'm responsible for an important part of our project—and I've been here less than a year."



"I didn't really believe I'd get responsibility and recognition because IBM is so big, but I've had plenty of both."

Bill Amelio joined IBM at Endicott, New York with a BS in Chemical Engineering from Lehigh and is now getting an MBA under IBM's tuition refund plan.

"I'd worked at other companies during the summer and all I ever got was make-work. I expected more of the same at IBM but they put me right to work and I haven't stopped yet. Our team creates printed circuits, from raw materials to finished product, and now we're going into full scale production. And that's really fun, writing the specifications for the equipment, getting it, installing it, debugging it."

Bill has already won an award and been promoted to manager. "It's a challenge and a thrill to work here," he says. "IBM is wide open to ideas. And they're ready to help you put your ideas into practice. In a company this size, there's always someone who's an expert on any problem you might have. It's great to know that when you ask for help you get it from some of the top people in the field."

Bill sums it up this way: "Even the students we hire for the summer get interesting assignments—real jobs to do. Come to IBM and I guarantee you'll never be bored."

mechanical devices and systems and robotics, including the design of intricate mechanisms such as print heads, head/arm mechanisms for files, and paper handling devices. They also design and develop electromechanical system controls, servomechanism control systems, high-speed mechanical and electromechanical devices, tests and tools. Recent graduates are as much concerned with generating new ideas as with the construction of prototypes. Challenges lie in the full exploration of materials, in pushing static and dynamic behavior of designs to theoretical limits and in optimization of cost and reliability.

Mechanical packaging

Engineers and scientists working in product package and cooling design are responsible for designing the mechanical package that contains all the functional units of a product, including frames, gates, covers and subassemblies. The product must meet structural requirements for shock and vibration as well as requirements for environmental protection, manufacturability and serviceability. Particularly challenging is the continuous attempt to reconcile function and cost through innovation and application of the latest technologies.

Microcode development

Recent graduates design, develop and test microcode that establishes the interface between software and hardware to meet architectural, application and performance requirements. Machine, assembly and high level languages are used to produce microcode for general purpose processors, signal processors, control units, displays, storage systems and interface equipment.

Optics

IBM applies state-of-the-art optical technology in a number of areas, including development of optical fiber communication systems, copiers, printers and holographic scanners. Recent graduates find challenges in optical system design, electro-optical integration, system performance analysis and development of components and applications in the fields of lasers, optical fibers, cathode ray tubes and plasma displays.

Printer technology

Encompasses a wide range of technical disciplines involved with the design, analysis and testing of high speed mechanical and electromagnetic devices. This involves assignments in such areas as acoustics, organic and polymer chemistry, laser optics, electrostatics and magnetics. Work in this technology is generally focused on mechanical impact printing and on non-impact printing using electrophotographic, ink jet, magnetics or thermal techniques.

Process engineering

Assignments in process engineering range from development of advanced processes and tools to their implementation and support in manufacturing. Today IBM products require more complex and advanced materials, tooling and process technology than ever before. The process engineer's responsibilities include development, design, feasibility installation, debug and manufacturing of process tools using technologies such as fiber

optics, thin films, photolithography, vacuum deposition, sputtering, etching, ion milling, lasers, plating, heat treatment, molding, machining, plasma technology, assembly, brazing, sintering and bonding.

Product test and assurance

Professionals in product test and assurance see that each product meets all specifications and that the result is satisfactory to the customer and IBM. Recent engineering and computer science graduates are involved from product inception through the entire development and manufacturing cycle, from basic microelectronic technologies through individual products to the final system—including all aspects of system communications. They assure appropriate test procedures are developed to cover product requirements in function, performance, stress, reliability, serviceability, human factors, conformance to national and international specifications, and overall product quality. IBM's "first and toughest customer," product test and assurance people develop analytical techniques, simulations and statistical tests as well as do hands-on evaluation of prototype designs.

Quality engineering

Involved from early development through manufacturing and the entire product life cycle, quality engineers measure and control the quality of IBM products. They help coordinate efforts to establish a sound manufacturing plan, monitor production lines and conduct in-depth testing of finished products in the laboratory. Other responsibilities include detailed manufacturing process audits and product performance reporting.

Quality technical assurance of purchased items is also an important function. It involves product evaluation, vendor product line qualification and sample testing.

Reliability, availability and serviceability

As a member of a development project, the "RAS" professional works to incorporate new hardware and software techniques into the design of a product to improve reliability, availability and serviceability. Statistical simulation and other modeling techniques are used to show tradeoffs between development expense, product cost and the cost of servicing the product. In addition, RAS professionals develop software diagnostic aids and product maintenance procedures.

Semiconductor design

Assignments in this area present the challenge of advancing the state-of-the-art in semiconductor logic and memory devices. The thrust is toward achieving greater logic circuit and memory bit density per device with increased performance. Designers apply knowledge of device operation, materials and process to computer modeling of advanced device designs and structures as well as to the exploration of new device types and contact schemes. They determine vertical and horizontal ground rules for each layer of the device to assure functionality and manufacturability of the new device design. The

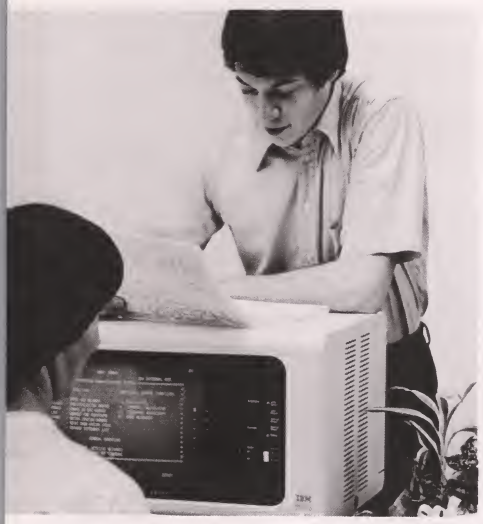
Sandy Goodwin joined IBM in Princeton, New Jersey, with a BS in Mechanical Engineering from Purdue University. She is a product engineer responsible for developing and releasing design improvements in blood cell processors and electrocardiogram machines.

"I enjoy my job because it involves me with customer engineers and marketing people out in the field, so every day is different. We have to keep them up to date with our latest products and they keep us informed about customer needs.

"I've had several designs adopted. I also have my name on two invention disclosures. All in less than a year.

"I do recruiting for IBM—it's easy to sell something you believe in. And one of my major selling points is IBM's size. A big company can back its people with the best resources. And a big company can offer plenty of opportunity for advancement and for moving into new areas. But even though the company is big, you work in small teams, so your managers know who you are and what you can do. It's like working for a small company within a huge one."

"I wanted to be doing important work from Day One, and that's what I got in IBM's Biomedical System Group."

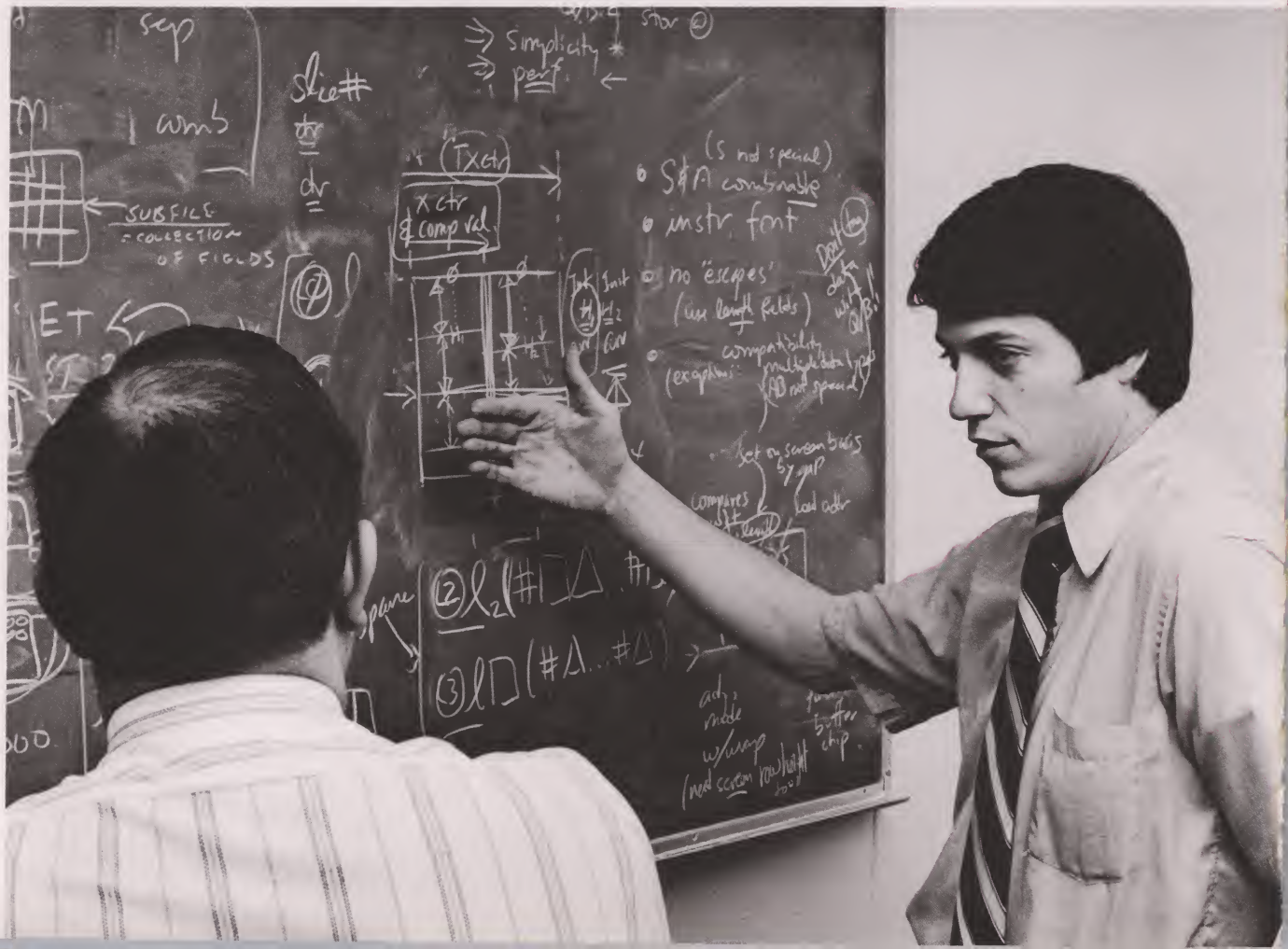


Mark Pavicic, with a BS in Electrical Engineering from Iowa State University and a master's from the University of Illinois, worked for another high-technology company before joining IBM two years ago in Rochester, Minnesota.

"I've been working on advanced work station architecture, and the design of high performance multiple application display adapters. This gives me a chance to travel to a lot of other IBM sites to take advantage of the opportunities to share ideas and gain more expertise. So I've met a lot of people in the company and can say that people are IBM's major strength. There are authorities on any subject you want to know about, the top people in their fields, and they're happy to share their knowledge."

Mark has already been promoted and says "there's no end in sight. That's the amazing thing about IBM—the management system is so personal. They know who you are and what you have done and what you want to do. Nobody slips through the cracks. You can see why I'm urging my brother to come to IBM when the time comes."

"I've found a lot of opportunity here at IBM. Not many companies offer you so much room to grow."



designer typically works closely with the process engineer to establish feasibility.

Software engineering

IBM is continually exploring new tools, techniques and methods to improve the quality and productivity of software development. Software engineering is concerned with the technological and organizational problems of developing modern operating systems and advanced applications. IBM programmers who specialize in this area can help improve quality and lower the cost of current and future IBM program products. Software engineers get involved in every aspect of systems development, including project management, cost estimation, software science, program verification techniques, structured programming, design methods, complexity theory and programming tool development.

System architecture and analysis

System architect/analysts in IBM help plan and design the overall structure of a computer system and define interfaces within that system. They must assume overall integration of applicable hardware, software and engineering support products and functions to provide a better system solution. They also evaluate applications of existing components and products, define new product design requirements and apply new technologies.

Work may involve new algorithms for mathematical functions, virtual-address structures, storage hierarchies or attachment of I/O devices. Architect/analysts must consider problems of the user and installation manager, including system reliability and availability. The end result of the work is the detailed architecture definition of a particular system.

Systems programming

Systems programmers are often called "programmers' programmers." They develop highly complex operating systems—those programs that tell computers what to do and when to do it. Their work makes it easier to program computers and make them more responsive to the needs of customers. Systems programming typically involves specification architecture, design, coding, testing, performance measurement and field support activity. At IBM, recent graduates working in this area can get involved in operating system design, multiprocessing, multiprogramming, distributed processing, networks, data base systems management, telecommunications, input/output device support and optimization.

Technical publications

Recent graduates in engineering or computer science—particularly those with a minor in English—can find challenging opportunities in writing technical publications. Information describing the use, installation and maintenance of computer products must be written in clear, concise language. People working in this area must understand complex technological concepts and translate that knowledge into a simple, straightforward presentation. When developing documents, technical writers work with various groups, including development engineering and programming, product planning, marketing and field service. Whether producing a system

guide, reference manual, application overview or machine maintenance manual, the technical writer will find this area an excellent way to launch a career in technology.

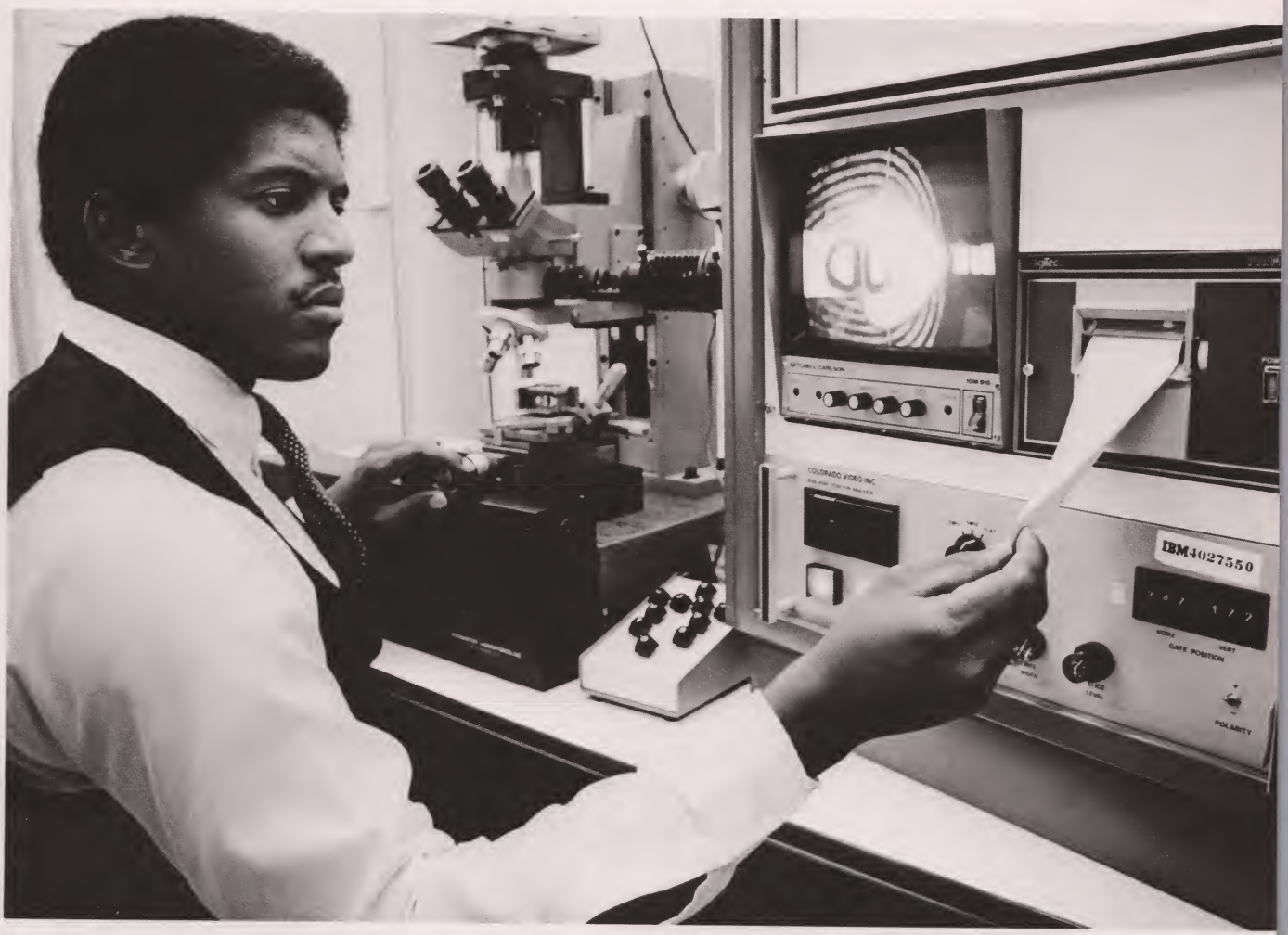
Test equipment design

Accurate test and diagnosis is vital in today's product development and manufacturing systems. Test equipment engineers must create systems to execute flawless tests and automatically generate repair diagnosis when a fault is detected. Testing requirements must be balanced at each stage of the development and manufacturing process for a final defect-free product.

An integral part of the product development team, test equipment engineers develop strategies and plans to meet development and manufacturing test requirements. Increased circuit, chip and memory densities and packaging requirements in VLSI (Very Large Scale Integration) demand imaginative test solutions as well as microprocessor adaptations hosted by high end processors and creative robotic adaptations for precision handling of micro components. Recent graduates also become experts in data analysis and interpretation of product test results, and suggest design and process changes for improved product quality.

Thermal analysis

IBM conducts a wide range of analytical and experimental studies to help enhance cooling capability and thermal environmental control of company products. Thermal conduction analyses, utilizing linear ordinary and partial differential equations or numerical finite difference and finite element techniques, are used to model and optimize thermal paths in electronic packages. Convective heat transfer experiments measure and improve heat transfer coefficients as well as pressure drops over or through typical component cooling surfaces. Statistical simulations are performed to characterize variations in thermal performance in the full range of IBM products, from integrated circuit chips to large computer systems. IBM is also actively engaged in joint research in basic heat transfer with several leading universities and retains noted heat transfer professors as thermal consultants.



"After less than two years, I was promoted to manager, and that's only the beginning."

Robert Goady studied two years at the U.S. Naval Academy and then transferred to the University of California at Berkeley, where he earned a BS in Mechanical Engineering. Now he's working at IBM's plant in San Jose, California.

"When you come up with innovative solutions to problems, you are given more opportunities to perform and expand your mind. They pay for performance and provide you continuing challenges.

"For example, IBM makes every effort to ensure that you have the equipment you need to do your job. Right now we're working on magnetic heads, developing a new technology. You can't just buy what we need in any store. So we have to design what we need and then have it built, and that's really exciting. The facilities are just incredible. And so are the people. It's a good feeling to know that when you're working on a tough new project you can count on high caliber minds. Being a manager is a challenge, but its a terrific opportunity to stimulate people."

Robert has done recruiting for IBM and understands when students say they're afraid of being nothing but a number at IBM. "I had the same fear," he says, "but at this company they notice performance, so if you perform you can't get lost."

IBM Corporation
Manager of Professional Recruiting
11400 Burnet Road
Austin, Texas 78758
(512) 838-3300

Mission, products and technologies

IBM Austin develops and manufactures data entry systems, office systems and text products. In addition, a circuit packaging plant at the Austin site manufactures electronic components used in many IBM products.

Products developed include the Displaywriter Text processing System, a shared logic administrative system, a data entry system and a distributed data entry system. The site manufactures office systems and intelligent terminals supporting data entry and automated office applications including text processing, word processing and distributed data processing, as well as printer circuit components and printers for office systems.

Local discipline usage

Electrical engineering graduates work in logic design, product definition, system design, microprocessor design and adapters for controllers; digital filters and communications; analog circuit design involving amplifiers, filters, controls, oscillators, power supplies and regulators using discrete and LSI technologies.

Chemical engineers, industrial engineers, materials science, metallurgical and mechanical engineering graduates work on development, modification and support of chemical processes and materials used in the manufacture of office products. The processes include lamination, plating, photolithography, etching, chemical cleaning, soldering, chemical waste treatment, metal deposition by evaporation and projection printing.

Computer science, mathematics and physics graduates are involved in product definition, system design and architecture; software development, communication and device control programs; application of programming techniques and testing of microprogrammed routines.

Educational opportunities

Within easy commuting distance is the University of Texas which offers a broad range of educational programs, including IBM's Graduate Work Study program in engineering, computer science, chemistry, mathematics and physics. Both the University of Texas and St. Edwards University offer an MBA degree program.

Austin as a place to live

Austin—the state capital of Texas—enjoys a strong economy and a fair climate. Winters are mild. Warm summer days are moderated by pleasant evening temperatures. The nearby Highland Lakes provide hunting, hiking, fishing, water sports and camping. The city boasts 137 parks, 21 free swimming pools, nine golf courses and a host of other recreational pleasures. Cultural attractions include the Austin Ballet Society, Symphony Orchestra, Zachary Scott Theater, fine art museums and a local jazz festival. Housing in urban, suburban and rural settings is available, all with easy access to modern primary and secondary schools.

IBM Corporation
Manager of Professional Recruiting
P.O. Box 1328
1000 Northwest 51 Street
Boca Raton, Florida 33432
(305) 998-4787

Mission, products and technologies.

IBM Boca Raton is responsible for design and manufacture of small general purpose computer systems and personal computers, including hardware and software, wire matrix printers and subsystems, and advanced manufacturing systems and automation devices. The site also manufactures magnetic diskettes and develops special application hardware and software. Laboratory and manufacturing support includes technical product publications, automated test equipment design and manufacture, hardware/software product and quality testing, human factors design and testing and computer center operations.

Boca Raton products use the latest LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) semiconductor technologies. Extensive computer-aided design systems are used for activities such as simulation, custom chip design, test generation and performance measurements. Text preparation systems assist in creating and editing specifications and product publications.

Local discipline usage.

Computer science graduates design, code, build and test operating systems, assemblers, utilities, communication systems and language compilers in an informal hands-on environment, using the latest techniques and equipment.

Electrical engineers design and develop microprocessors, I/O device interfaces and small computers. They utilize integrated circuit logic and microprogramming with support from an advanced computer-aided design system. They also develop and maintain computer-driven test equipment and debug devices.

Industrial engineers analyze productivity, quality control and test methods, space planning, layout and materials handling.

Manufacturing engineers design, develop and implement manual or automated processes (including robotics), product flows, assembly tooling and fixtures, assembly aids and instructions for manufacturing existing and new products.

Mechanical engineers design and develop packages for electronics. Design consideration includes vibration, thermal cooling, stability, cost, configurability, packaging, safety and human factors. Printer development and robotics also offer challenges in electromechanical and system control disciplines.

Educational opportunities

Nearby universities, including Florida Atlantic University in Boca Raton, offer courses leading to a Master's degree in computer science, engineering, business and other disciplines. This graduate work study program provides financial assistance and time off for classes to pursue qualifying study. A technical education program provides seminars, formal courses and short courses presented by experts from IBM, other companies and leading universities.

Boca Raton as a place to live

Boca Raton is located on the Atlantic Ocean between Ft. Lauderdale and Palm Beach. Temperatures average 70 degrees in the winter and 82 degrees in the summer. There is no income tax, which contributes to the moderate cost of living.

Young professionals in this resort city enjoy beaches, scuba diving, water skiing and fishing. Golf and outdoor tennis can be played all year. Over 50 parks, including the Everglades National Park, are nearby. Broadway plays, symphonies, recording stars and speakers continually visit the area. The Norton Gallery hosts fine art shows.

IBM Corporation
Manager of Professional Recruiting
P.O. Box 1900
Boulder, Colorado 80302
(303) 447-5715

Mission, products and technologies

IBM Boulder has worldwide product management and development responsibility—including related programming and U.S. manufacturing responsibility—for copiers, copier systems, information distributors and flexible files.

Products include copiers with optional collators and smaller desktop copiers. The Information Distributor combines the technologies of electronic communications, laser printing and electrophotographic copying in a single multifunction unit. Flexible files are used in many IBM products to store data and instructions, including the Information Distributor. Boulder is also responsible for supplies used in copier products in the United States and magnetic media products used world-wide. Included among these supplies are toner, fuser rolls and photoconductor for copiers and recording media for dictating equipment, plus data cartridges for mass storage systems and half-inch tape for tape drives.

Primary technology responsibility is in the area of electrophotography and magnetic media. Other technologies used in Boulder include lasers, computer-aided design for assisting in the development of mechanical designs, robotics and automation of the manufacturing process, VLSI (Very Large Scale Integration) design and software engineering techniques for defect-free product software.

Local discipline usage

Chemistry/chemical engineering/materials science/metallurgical engineering graduates get involved in material synthesis, formulation, analysis/characterization and methods development. Additional areas of interest include process/product development, product instrumentation and process control with emphasis on disperse phases, surface phenomena and organic coatings.

Computer science/computer engineering opportunities in both large and small scale processors include architecture and microcode development for microprocessor controlled products; application of computer science techniques in

operations research, software engineering and graphics; scientific programming for statistical, mathematical and engineering problem solving; user and systems support programming in a multiple CPU virtual systems environment; and software development for computer-aided design and manufacturing.

Electrical engineering graduates contribute to activities that involve both design and utilization of systems and subsystems, microprocessors, custom LSI components, discrete and integrated digital and analog circuits, electromechanical interfaces and many facets of computer-supported design tools.

Industrial engineering graduates start with assignments in assembly line measurements and control, manpower planning, cost file preparation, as well as special I.E. studies. Operations research techniques are applied to various types of business problems.

Mechanical engineers find typical assignments in the design, analysis and testing of high speed mechanical and electromechanical mechanisms. Skills in dynamics, vibrations, kinematics, automatic controls, robotics, strength of materials, instrumentation and fluid mechanics are utilized. Computer-aided techniques are used for modeling, development, testing and optimizing designs.

Educational opportunities

Boulder has a graduate work study program that allows employees the opportunity to pursue graduate degrees in most engineering and scientific disciplines at the University of Colorado in Boulder or at any of the half-dozen other universities and colleges located in the area. IBM Boulder also offers the SURGE program in cooperation with the Colorado State University and the ACE program with Colorado University. Participants may pursue a Master of Science degree in an engineering discipline or an MBA while on site via video tapes. There are also two week-end programs available that lead to an MBA. Boulder's education department offers a wide variety of continuing-education classes. There is also an excellent technical library and a learning center that supports hundreds of self-study classes.

Boulder as a place to live

Nestled high in the Rocky Mountains, at the entrance to Boulder Canyon, this city of 70,000 retains the flavor of a small town while offering all the cultural benefits of a major metropolitan area. Only 30 minutes away is the state capital of Denver, the mile-high city that features the renowned Denver Symphony Orchestra, Lamont School of Music and the Auditorium Theater, which regularly books touring Broadway shows. Professional sports are well represented by some of the nation's top teams in basketball, football and hockey.

Boulder itself provides a wide variety of cultural activities, with the arts and humanities setting of the university as much a part of the local landscape as the rugged mountain backdrop. The "Greenbelt" plan for land acquisition is directed toward preservation of the city's natural beauty. Only a short drive away lie the Continental Divide, Rocky Mountain National Park and numerous other secluded areas providing some of the most spectacular scenery in the world.

IBM Corporation
Manager of Professional Recruiting
585 De Kalb Avenue
Brooklyn, New York 11205
(212) 780-2100

Mission, products and technologies

A multi-product manufacturing site, IBM Brooklyn produces completed units for domestic and international customers and subassemblies for other IBM locations.

Products that are used in small, medium and large systems include input/output cables, power supplies, regulators, power frames, power distribution units, electronic switching units, display terminals, printers and diagnostic testers. IBM Brooklyn is the primary domestic manufacturer for many of these products.

Brooklyn has technological responsibilities for air cooled and water cooled regulators and is the manufacturing center for electronic switching units.

Local discipline usage

Electrical engineers, mathematicians/statisticians, computer science and computer engineering graduates create the designs, tools, methodologies and test techniques needed to evaluate circuitries.

Industrial engineers simulate processes, develop standards and cost estimates, provide capacity and resource evaluations, define material handling techniques and develop solutions to facility requirements.

Mechanical engineers/metallurgists focus on materials and mechanical components. They define and design manufacturing processes and required sophisticated tooling.

Opportunities for recent *physics* graduates are available as well.

Educational opportunities

Specialized technical courses are offered on-site or at other regional IBM locations. In addition, the New York City area is one of the primary educational centers in the nation, with a wide selection of courses/degrees available from numerous well-known universities. Programs are available for advanced degrees in engineering, computer science and other disciplines.

Brooklyn as a place to live

The New York area is one of the world's foremost cosmopolitan locations. Educational opportunities are plentiful. Cultural and social offerings are unequalled in selection, including plays, museums, concerts and sporting events. For the outdoors enthusiast, opportunities for sailing, fishing, hunting and skiing are available nearby. A variety of lifestyles can be selected.

IBM's Brooklyn facility is located in the north central part of the borough, not far from such lovely residential areas as Brooklyn Heights and Cobble Hill. Referred to as the "Greenwich Village of Brooklyn," Brooklyn Heights is noted for its quaint 19th-century-style homes, quiet tree-lined streets, fine restaurants, riverside esplanade and magnificent view of the New York skyline. The Brooklyn Museum regularly offers nationally and internationally acclaimed exhibits. Through the dedicated efforts of the renowned Brooklyn Academy of Music, there has been a renaissance of theater arts, music and dance in Central Brooklyn.

IBM Corporation
Manager of Professional Recruiting
Essex Junction, Vermont 05452
(802) 769-0111

Mission, products and technologies

One of the world's largest semiconductor facilities, Burlington develops and manufactures logic and memory components for IBM computers and office equipment systems. Memory products include both FET (field effect transistor) and bipolar technologies. Burlington manufactures random access memory, read-only memory, bipolar and FET logic devices and microprocessors.

Local discipline usage

Chemical engineering graduates develop and optimize semiconductor fabrication processes through the application of disciplines such as thermodynamics, mass transfer, fluid mechanics, ion implantation, and surface chemistry. A technical base in the areas of diffusion, hot processing and photolithography helps to apply skills in high temperature diffusion, oxidation, kinetics and the etching in a variety of semiconductor materials.

Computer science graduates and programmers find challenging assignments in design automation in developing software systems; process automation to design small computer controllers coupled to testers and process tools; product logistics to develop methods and systems to optimize the management of products through the manufacturing process; management systems to create system solutions for financial, administrative and planning needs; engineering analysis and scientific computation.

Electrical engineers find challenges in the development, implementation, refinement and characterization of LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) circuits used in semiconductor components. Typical assignments might include process refinement to optimize circuit performance; circuit and device design to implement new and revise existing circuits for custom design digital logic and memory components; semiconductor characterization and reliability involving physical failure analysis of circuit performance; test systems engineering and product applications engineering.

Industrial engineers find a variety of positions in the dynamic field of semiconductor production. Responsibilities include the design, development and implementation of techniques for analyzing plans, proposals and alternatives. Industrial engineers assess and propose optimal usage of all resources including manpower, space, facilities and equipment.

Materials science and metallurgy/metallurgical engineering graduates play vital roles in the development and manufacture of new semiconductor materials and in the application of other materials to interconnect, passivate, insulate and package computer logic and memory devices. Emphasis is on investigating the manufacturability of materials, their mechanical/thermal characteristics, microstructure, modelling process repeatability and system aging characteristics.

Mechanical engineering assignments range from semiconductor packaging through the engineering process in design of assembly equipment. The mechanical engineer must remain abreast of the latest product and process developments to effectively analyze and recommend tools to complement the manufacturing process. Of special interest are skills involving photolithography, chemistry and optical physics. Additional skills desired include thermodynamics, hydraulics, pneumatics and fluidics.

Physics graduates find excellent opportunities in the field of device physics through application of skills to characterize LSI logic and memory devices used in current and future products. Skills are required to investigate the sensitivity of products to processing variations and a variety of operating conditions. In the area of reliability physicists are required to predict and characterize subtle new failure mechanisms encountered in devices.

Career opportunities are also available at IBM Burlington for *ceramic engineering, mathematics and statistics* graduates.

Educational opportunities

Three area colleges offer MS graduate degree programs in chemistry, computer science, electrical engineering, mathematics and statistics, mechanical engineering and physics. They also have a PhD. program in chemistry, electrical engineering and mechanical engineering. The three colleges are St. Michael's College in Winooski, Trinity College in Burlington and the University of Vermont in Burlington.

Burlington as a place to live

IBM Burlington is located eight miles east of Burlington, the largest city in Vermont. The city is a progressive business, social and academic center. The major educational institutions in and around Burlington have influenced Burlington's cultural richness. Summertime finds the Champlain Shakespeare Festival in residence at the University of Vermont. The Vermont Mozart Festival comes to the area for a three-week residence in July. The University of Vermont brings first-rate theatrical, musical and variety entertainment to the area throughout the year.

The Green Mountains and the Adirondacks make the area a year-round vacation place. The ski capital of the East at nearby Stowe is but one of several excellent downhill areas. Cross-country ski locations are located in Burlington itself as well as in the vicinity. In summer, the mountains and Lake Champlain provide a wide variety of outdoor sports and activities, including backpacking, tennis, sailing, canoeing, swimming, fishing, golfing and hunting.

IBM Cambridge Scientific Center
545 Technology Square
Cambridge, Massachusetts 02139
(617) 421-9291

Mission

The Cambridge Scientific Center is staffed by a small group of computer professionals working on the leading edge of software technology and product prototyping. They work on problems of advanced technology, bridging the gap between pure research and development and applying computers to the solution of real world problems. At various times the center has investigations underway in the fields of distributed processing, intelligent terminals, end-user systems, modeling and other operating system technologies.

Local discipline usage

Computer science/computer engineering—Software and systems design, prototyping and evaluation.

Mathematics and statistics—Application of algorithms and techniques to solutions of computer problems.

Educational opportunities

The Cambridge/Boston area is home for some of the world's foremost universities including M.I.T., Harvard, Boston University, Northeastern University, Boston College and others. They offer comprehensive undergraduate, graduate and special study programs in computer science and related technical areas.

Cambridge as a place to live

Boston and its surrounding communities, including Cambridge, provide a wide range of living environments, from the activity of a major cosmopolitan city to the tranquility of rural New England. The area is a major focus of cultural activity—the home of the Boston Symphony, Boston Ballet, Museum of Fine Arts, Opera Company of Boston and the Boston Pops. Old buildings become modern restaurants and shops at Boston's famous Quincy Market. Recreational areas for boating, camping and skiing are within easy reach. Major league sports are plentiful. Area restaurants feature local and international cuisine.

IBM Corporation
Manager of Professional Recruiting
1001 W.T. Harris Boulevard
Charlotte, North Carolina 28257
(704) 598-1000

Mission, products and technologies

The mission of IBM Charlotte is to develop and manufacture products for the banking industry, including teller systems, cash dispensing systems and check handling systems. The site also develops and manufactures printers and develops plant data collection systems for the manufacturing industry. In addition, Charlotte assembles and tests electronic circuit assemblies for much of IBM's equipment manufactured at other locations.

Products include keyboards and display devices, optical and magnetic character recognition systems, serial printers, microfilm machines, automated teller machines, document processors, communication controllers and program products. Technologies utilized are optical and magnetic character recognition, high-speed paper transports, electroerosion and impact printing devices, optical lenses and robotics.

Local discipline usage

Chemistry and analytically oriented graduates knowledgeable in the theoretical and instrumental aspects of quantitative analysis conduct basic and applied research as it relates to polymer and other chemically related sciences. They also direct laboratory technicians and interface with development personnel. Areas of interest include basic dye chemistry, development of specialized material testing and chemical separation schemes as well as performing material failure analysis.

Computer science and computer engineering graduates make use of various languages while developing and implementing a wide range of programming products and application systems. You will use the latest programming techniques and aids in developing programming products to support the devices and systems developed in Charlotte. Application systems are developed to support both development and manufacturing facilities as well as in support areas such as finance.

Electrical engineers develop systems and logic to control complex electro-mechanical, magnetic and optical devices and design functions to allow communication with other devices. They are involved in all aspects of development, including the development of on-chip adaptors for microprocessors, making hardware trade-offs and writing code. Responsibilities include capturing handwritten and magnetic data plus working with microfilm and video cameras, pneumatic and optical sensors and paper in flight at very high speeds.

Industrial engineers are responsible for establishing and implementing consistent policies, practices and techniques for increasing the productivity and efficiency of all manufacturing resources. Indus-

trial engineers provide services in industrial engineering systems, line industrial engineering, space planning and distribution, manpower planning, cost engineering and procurement estimating.

Manufacturing Engineering responsibilities cover the initial concept to the actual shipment of a product, including influencing the product design. MEs also perform design analysis and assessment of mechanical and electrical problems as well as tooling and sourcing of parts and assemblies. Skills are utilized in assembly techniques and in the use of polymers, castings, machining and elastomers.

Materials science engineers are responsible for a broad field of materials that include both metals and non-metals. This field encompasses knowledge of plastics, metals, rubber, adhesives and organic coatings. Responsibilities may include material consultation, selection, specification, characterization, testing, and implementation related to the development of a wide range of electro-mechanical products.

Mechanical engineers employ technologies such as magnetic and optical character recognition, computer-assisted graphic design, high-speed paper handling and robotics while performing dynamic load analysis, diagnostics, package design, cost and manufacturing processes decisions, as well as problem determination and resolution.

Metallurgical engineering graduates are responsible for the selection of appropriate metals, processes and finishes for machine components, taking into consideration mechanical, electrical, magnetic and chemical properties as well as cost. In the laboratory, metallurgists are involved in failure analysis in the areas of stress, fatigue, corrosion and wear. They verify metal compositions and heat-treatment using techniques such as metallography, mechanical testing, magnetic testing and X-ray fluorescence analysis. Included are all types of components, welds, brazed and solder joints as well as all types of surface finishes.

IBM Charlotte also employs graduates with degrees in *ceramic engineering, mathematics, statistics and physics.*

Educational Opportunities

Within and near Charlotte are a variety of colleges and universities offering a wide range of undergraduate and graduate degrees in almost every discipline. One of the largest—and the home of one of IBM's Graduate Work Study Programs in engineering—is the University of North Carolina at Charlotte.

Charlotte as a place to live

The spirit of Charlotte bids welcome to all newcomers. Although incorporated in 1768, Charlotte is in constant renewal. Here is a city that has remained small—with a population of 350,000—yet is considered a major financial, medical, transportation, education and communication center for a 12-county area that serves 1.2 million people.

Cultural activities are freely available. Spirit Square, for example, is the center for performances by the Charlotte Symphony, the Charlotte Opera Association, Dance Charlotte and other groups. And there is other entertainment... professional soccer and baseball, ACC basketball and famed motor racing...and much more.

Charlotte has the advantage of a mild climate with four distinct seasons. Combine that with the North Carolina 300-mile-long coastline and the Blue Ridge and Great Smoky mountains and you'll find year-round outdoor activities including skiing, swimming, fishing, hiking, golf and tennis.

IBM Instruments, Inc.
1 Orchard Park
P.O. Box 332
Danbury, Connecticut 06810
(203) 796-2500

Mission, products and technologies

IBM Instruments, Inc. is a wholly owned subsidiary of the IBM corporation responsible for IBM's efforts in marketing, servicing and support of analytical instruments.

Products are analytical instruments used for research, development, quality control, environmental control and medical applications. These include Nuclear Magnetic Resonance, Electron Paramagnetic Resonance, Infrared Spectroscopy, Liquid Chromatography and a line of Electromechanical Analysis instruments. IBM Instruments products are used to identify the chemical composition of samples. The company also markets an NMR-based Process Analyzer used for process and quality control as well as a line of analytical instrument supplies.

Local discipline usage

Chemistry and physics majors find job opportunities in the operation and demonstration of analytical instruments, technical support for marketing representatives, support for customer applications at IBM Instruments demonstration centers and research in the chemical/analytical field.

Computer science/computer engineering graduates are involved in various facets of computer and program development. Activities include system and software design based on micro- and miniprocessors used for control and data analysis applications involving analytical instruments and programming utilizing assembly and high-level languages.

Electrical and mechanical engineers are involved in various analytical instrument manufacturing/engineering activities in the U.S. and abroad. Emphasis is placed on product design, including parts fabrication, tooling, assembly and test processes, printed circuit board fabrication and test. Key measurements include capacity, schedule, cost and product performance.

Educational opportunities

Educational facilities in and around the Danbury area include RPI Extension, Western Connecticut College, Yale, Fairfield University, University of Bridgeport, University of New Haven, Pace and major colleges and universities in New York City.

Danbury as a place to live

Located 60 miles from New York City and a few short miles from New York's Westchester County, Danbury and the neighboring communities of Ridgefield, Brookfield and Newtown offer a broad and varied living style. Colonial, modern and traditional influences blend in a way that appeals to all who come to live here.

Recreational activities in the Danbury area include swimming and boating on Long Island Sound, and skiing in the Berkshire mountains. Professional sports include football, basketball, baseball, soccer and world class tennis in New York City.

Cultural activities in the area include the American Shakespeare Theater at Stratford, Westport Country Theater, Long Wharf, Yale Repertory Theater, Jacob's Pillow and the Berkshire Music Festival. In addition, the cultural attractions of New York City (with its theater, ballet and museums) are only an hour and a half from Danbury.

IBM Corporation
Manager of Professional Recruiting
Route 52
Hopewell Junction, New York 12533
(914) 897-2121

Mission, products and technologies

IBM East Fishkill develops and produces microelectronic components and related packaging used in the company's most powerful and advanced information processing equipment. Since opening for business in 1963, the site has become one of the world's largest and most sophisticated semiconductor development and production facilities. Products include bipolar logic and bipolar array devices, bipolar special circuits, silicon wafers, lithography masks and electronic hardware for analog and digital control.

Local discipline usage

Ceramic engineers develop new ceramic technologies for both the semiconductor and packaging areas. They help conceive, design and implement the products that will constitute the computer systems of the future. Specific areas include characterization and selection of materials and processes, evaluation of their effect on the semiconductor device and the definition and implementation of new processes and control techniques.

Chemistry/chemical engineering graduates play a major role at East Fishkill. Major areas involving chemistry are crystal growth, high temperature chemistry, polymers, plasma chemistry, chemical vapor reactions, structural quality of materials, defect studies, solid state diffusion and phenomena, material analysis and purification and surface chemistry of thin films.

Chemical engineers get involved in complex experiments involving semiconductor processing. They also introduce new products and evaluate new processes. Skills are also applied to experimentation on liquid vapor equilibrium systems and in-depth reviews of all current and advanced processing technology.

Computer science and programming people work with IBM's Engineering Design System (EDS), a set of design application programs that supports design of the full range of IBM products. They help product developers define and enhance the design process as well as propose and develop new tools. Challenges are also found in development of systems to release engineering data and a wide range of application systems for manufacturing support.

Electrical engineers assume varied product design and test engineering responsibilities. They help set strategic directions, define component product offerings, design products, direct development efforts and provide worldwide support for product engineers and user applications. The test electrical engineer is involved in product architecture, detailed design and implementation of analog and digital circuits as well as test systems architecture and advanced system integration applications.

Industrial engineers/manufacturing engineers work in industrial engineering, facilities planning, operations research, cost engineering and production planning. Assignments and career paths are varied.

Materials science graduates characterize and select materials and processes, evaluate their effect on semiconductor devices and define and implement new processes and

control techniques. They continually solve problems, including determination of failures in material, device structure and/or process.

Mechanical engineers originate and develop ideas for advanced processes and equipment in semiconductor and packaging technologies, working in areas such as electron-beam and optical lithography, metrology, ion beam, plasma deposition technology, dry etching and thin film. They work with Multilayer Ceramics (MLC) packaging technology as well as machine design, thermodynamics, fluids, instrumentation and packaging principles to design and build production equipment. They also create machinery to test semiconductor chips, wafers and microcircuit modules.

Metallurgy/metallurgical engineering graduates develop new alloys for semiconductor packages. They use knowledge of alloying, heat treatment, soldering, brazing and mechanical testing. Experimental studies are made of basic degradation mechanisms (low cycle fatigue, electromigration, thermomigration) relating to interconnections.

Physics graduates are in the forefront of silicon semiconductor technology. The physicist calls on fundamental concepts rooted in quantum mechanics to comprehend the behavior of circuits and other devices tightly packed on tiny silicon chips.

Career opportunities are also available for graduates in *computer engineering, mathematics and statistics* as well as *facilities and environment engineering.*

Educational opportunities

Excellent educational programs are available at nearby colleges and universities. Within commuting distance are Marist College, Vassar College and the State University of New York at New Paltz, plus extension programs of Pace University, Polytechnic Institute of New York, Rensselaer Polytechnic Institute, Syracuse University and Union College. Based on business need, IBM employees seeking advanced degrees in the fields of ceramic engineering, chemistry, computer science, electrical engineering, materials science, mathematics, operations research and physics may be assisted with tuition and fees at many of these schools as part of the graduate workstudy program.

East Fishkill as a place to live

Part of the scenic Hudson River Valley—located in New York's Dutchess County—the town of East Fishkill and the surrounding region offer the best in country and suburban living. The majestic Hudson River and numerous mountain lakes are easily accessible to water sports enthusiasts. Just across the Hudson, the U.S. Military Academy at West Point draws local fans to football games, concerts and regimental reviews. Several ski areas are found nearby.

IBMers can also join the company-sponsored country club in nearby Poughkeepsie, which features an 18-hole golf course, swimming pool, bowling, tennis, ball fields, archery and pistol/rifle/trap ranges as well as modern gym facilities. Other activities in the area include a philharmonic orchestra, choral groups, ballet and community theater.

For a change of pace, 65 miles to the south is New York City and its boundless attractions, including major league sports, Broadway theaters and musical events.

IBM Corporation
Manager of Professional Recruiting
1701 North Street
Endicott, New York 13760
(607) 755-0123

Mission, products and technologies

IBM Endicott's mission is the development and manufacturing of medium-sized commercial computers, impact printers and circuit packaging, plus development of related operating system programs.

The site is responsible for the development and manufacturing of the 4300 series and the System/370 intermediate processors plus the development of system control programs, data base programs and other related software. The facility also develops and manufactures serial and line printers covering a broad performance range. Circuit packaging products range from ceramic substrates through printed circuit panels used for subsequent levels of semiconductor packaging in IBM products.

Technologies used include computer architecture, computer logic design, LSI (Large Scale Integration) and VLSI (Very Large Scale Integration) circuit and logic design, interactive and graphic system design, database architecture, microprocessor application development, semiconductor process development, high speed impact printing and printed circuit packaging technologies.

Local discipline usage

Ceramic engineers participate in electronic packaging work in the development of substrates for the mounting of VLSI chips. They do product engineering work on substrates used in current products. They also improve manufacturing techniques and maintain competence on related technologies.

Chemists and chemical engineers work on process development in electronic packaging, process development and maintenance in manufacturing engineering, support vendor processes, materials laboratory and characterization and environmental protection such as pollution analysis and waste treatment.

Computer science graduates develop and maintain system control programs and write application programs for problem solving for a complex data processing center. They find rewarding careers in areas of performance measurement, system test, planning control and business applications.

Electrical engineers and computer engineers design intermediate size processors, printers and circuit packages. They demonstrate feasibility of the idea, design and test the product. There are also careers in microprogramming, manufacturing and facilities engineering, logic design and quality engineering.

Industrial engineers support manufacturing in the areas of layouts, product/process flows, standards, unit hour generation, workload generation and vendor plans. They support process engineering, finance and production control in the areas of workload problems, quota/schedule allocation and economic justifications.

Materials scientists develop processes for production, analyze surfaces and study the mechanics of materials, such as thermal effects, fatigue, stress and failure analysis. They can also work in areas of advanced packaging technologies, papers and inks.

Mathematicians and statisticians find rewarding careers in mathe-

matical models and statistical data analysis. Included are circuit board data analysis; quality engineering evaluation, test data analysis for new products and products in the field, simulation, analysis of programming performance, reliability analysis and design of experiments.

Mechanical engineers develop the physical layout, parts, assemblies and packaging of processors, printers and circuit packages. They build prototypes for testing, analyze performance and select materials and tools for production. Responsibilities also include design of automatic tools. Typical assignments are found in tooling design; and in facilities, test and manufacturing engineering.

Metallurgists and metallurgical engineers work in development engineering on improvement and innovation of circuit packages in all products, specifically in soldering of circuit boards, metals on ceramic substrates and wiring. They also work in manufacturing engineering to develop processes for new products as well as improvement of existing processes.

Physicists find rewarding career challenges in developing solutions to complex development and manufacturing problems associated with structural product design, parts manufacture, movement, assembly and test. Skills are utilized in fluid mechanics, environmental analysis, stress, structural design, laser technology, acoustics, optics, electromagnetics, printer mechanisms, electrostatic printing, electro-sensitive papers and processors.

Educational opportunities

The Endicott location is within commuting distance of a number of colleges and universities that provide courses that qualify for either IBM's graduate work study or tuition refund programs. These institutions include the State University of New York (SUNY) at Binghamton, Cornell University, Syracuse University, Elmira College and the University of Scranton. IBM Endicott has a Graduate Work Study Program leading to a master's degree from either SUNY at Binghamton or Syracuse.

Endicott as a place to live

Nestled in the gently rolling hills of New York State's scenic southern tier is the Village of Endicott. A pleasant blend of small-town friendliness and first-rate services and facilities, Endicott, Johnson City and Binghamton form the Triple Cities area of New York State.

The area offers an abundance of cultural and recreational activities. Roberson Center for the Arts and Sciences is the focal point for many fine cultural organizations. The facility consists of museums, a large public observatory, five galleries, a theater and classrooms. Roberson also sponsors plays, musical performances, ballets and films. The area's performing arts theater hosts the Binghamton Symphony, the Tri-Cities Opera, BC Pops and the Southern Tier Civic Ballet.

The geographical diversity of this region, coupled with a four-season climate, provides a full range of recreational activities. There are many public golf courses, indoor and outdoor tennis courts and several lakes and rivers offer fishing, sailing, canoeing and waterskiing. Numerous other facilities attract hikers, campers, skiiers, snowmobilers and other outdoor enthusiasts. Major league sports and the attractions of New York City are a few hours away by automobile.

IBM Corporation
Manager of Professional Recruiting
18100 Frederick Pike
Gaithersburg, Maryland 20760
(301) 840-0111

Mission, products and technologies

The mission of this site is the design, development, integration, test and operational support of spacecraft ground-based command, control and communication systems, spaceborne electronic systems and special information systems for the Federal Government.

Products include systems employing IBM commercial data processing equipment and software products, and specially developed equipment and application computer programs for command, control, data communications, data base management and sensor signal processing for surveillance and warning.

Some of the technologies used are data processing system architecture, software architecture, satellite telemetry data handling, system integration and test, precision spacecraft orbit determination and control, data base management, display and control software, system control software.

Local discipline usage

Computer science/computer engineering—realtime computer system and software architecture requirements analysis and design; operating system, application and support software design, development, integration and test; programming in high order languages; benchmark testing on IBM commercial computer systems.

Electrical engineering—system requirements analysis, architecture definition, design, development, test and integration of systems employing commercial and militarized data processing, communications and display equipment; signal and data processing algorithm analysis and design; reliability, availability, maintainability, human factors engineering; logical, electrical and electrical packaging design.

Industrial engineering—design, modernization and maintenance of office and laboratory electrical, heating and air conditioning facilities.

Mathematics/statistics/physics—precision spacecraft attitude and orbit estimation; prediction and control algorithm design and analysis; communication system performance analysis and system performance modeling.

Mechanical engineering—ground based electronics, thermal, structural and installation requirements analysis.

Educational opportunities

A wide range of undergraduate and graduate study programs in engineering, mathematics, computer science and physics are offered by nearby universities including American, Catholic, Georgetown, George Washington, Howard, Maryland and the District of Columbia. Johns Hopkins and Morgan State are in nearby Baltimore and Hood in nearby Frederick.

Gaithersburg as a place to live

Personnel at the Gaithersburg facility, about 15 miles northwest of Washington, D.C., have access to a wide range of housing accommodations including city, small town, suburban and rural areas approximately 15-45 minutes from Gaithersburg. Cultural opportunities include Washington, D.C.'s Smithsonian Institution, Kennedy Center and Wolf Trap Farm Park for the Performing Arts. Restaurants in the area offer cuisine from around the world.

Recreational opportunities lie within easy driving time and include boating and fishing in Chesapeake Bay, the Atlantic Ocean and numerous streams and lakes in Maryland, Virginia and Pennsylvania.

IBM Corporation
Manager of Professional Recruiting
1322 Space Park Drive
Houston, Texas 77058
(713) 333-5060

Mission, products and technologies

IBM Houston's mission is the design, development, integration, test and operational support of spaceborne and ground-based systems for the Federal Government's manned spaceflight program.

The site's products include spaceborne and ground-based information processing software and support for space transportation systems; complex data processing and information handling systems for manned space-flight mission planning; realtime mission support, payload data processing and spaceborne software for manned spacecraft flight control.

Technologies used include data processing system, hardware and software architecture, telemetry data handling, precision spacecraft orbit determination, flight control displays, distributed systems, data bases, high reliability/available systems design, post-flight data analysis and flight simulation.

Local discipline usage

Computer science/computer engineering—realtime computer system and software architecture requirements analysis and design; operating system, application and support software design, development, integration and test; programming in high order languages.

Electrical engineering—system analysis, architecture definition, design, development, integration, test and support of hardware and software systems; guidance, navigation and flight control systems simulation and data analysis; aircraft and spacecraft operations analysis; reliability, availability, maintainability engineering and analysis.

Mathematics/statistics/physics—Spacecraft trajectory analysis and prediction; guidance, navigation and flight control system simulation and analysis; computer programming for mathematical and scientific computations.

Mechanical engineering—Spacecraft electronics thermal, structural and installation requirements analysis.

Educational opportunities

Rice, the University of Houston, Texas Southern University, St. Thomas, Houston Baptist, and Texas Medical Center graduate schools offer a wide choice of undergraduate and graduate study programs in engineering, mathematics, computer science and physics.

Houston as a place to live

This Gulf Coast metropolis combines the excitement of a frontier past with the science and trade of a promising future. Beneath a skyline "under construction," new comers are offered a year-round outdoor life, the absence of city/state income taxes, an international flavor and major cultural and recreational events. The city has an unemployment rate half the national average. Job opportunities abound, which makes Houston a special boon to dual-career families. FSD Houston is located midway between the city and Galveston Island in the Clear Lake resort area noted for boating and fishing. The facility adjoins NASA's Johnson Space Center.

Cape Canaveral, FL.

In addition, IBM operates a facility at Cape Canaveral, Florida, to develop and test spaceborne electronic systems for the Federal Government. Part of the Kennedy Space Center, the facility designs, develops, manufactures, tests, integrates and supports systems associated with the U.S. space program. Its highly complex test data systems support Space Shuttle launch and launch-preparation facilities. It provides checkout facilities for launch components and programming for the Space Shuttle onboard data management system.

Local discipline usage at Cape Canaveral is the same as at IBM's facilities in Houston, Texas. If you are interested in career opportunities available at Cape Canaveral, write to:

IBM Corporation
Manager of Professional Recruiting
7900 North Astronaut Blvd.
Cape Canaveral, Florida 32920
Telephone: (305) 783-0060

IBM Corporation
Manager of Professional Recruiting
P.O. Box 100
Kingston, New York 12401
(914) 383-0123

Mission, products and technologies

Kingston is involved in a broad spectrum of development activities that includes worldwide responsibility for distributed data processing systems and display workstations, communications program products, very large scale integration (VLSI) circuit technology and the manufacturing of gas panels for display workstations.

Products developed include computers specifically designed for distributed data processing applications; telecommunications program products that support computer networks; text and office systems; cathode-ray tube (CRT) and gas panel display workstations; microprocessors and power systems.

Local discipline usage

Chemistry/chemical engineering graduates find opportunities that encompass the entire chemical profession. Chemical skills are applied to the highly sophisticated challenges of synthesizing, developing, characterizing and selecting product design materials.

Computer science/computer engineering applications range from programming design, development and testing of communications program products, operating systems, compilers, data bases and utilities to input/output device control and diagnostic programming.

Electrical engineering graduates use state-of-the-art technologies and design tools (e.g., macro design systems) and have responsibilities in areas such as logic design, digital circuit design, analog circuit design and micro-programming. Other challenging areas involve facilities, manufacturing, quality and environmental testing.

Industrial engineering assignments involve the analysis, release and manufacture of hardware products and highly complex (i.e., VLSI circuitry) process-oriented operations.

Mechanical engineering assignments include static/dynamic machine design and layout, component packaging, heat transfer and material analyzers, automation design (robots), instrumentation and analytical designs for vibrations and shock testing of the related design.

Educational opportunities.

Among the area's many educational institutions are Union College (Extension), Syracuse University (Extension), Rennselaer Polytechnical Institute and Marist College. Under IBM's Graduate Work Study

program, employees may pursue M.S. or Ph.D. degrees at the above schools in engineering and/or scientific disciplines.

Internally, IBM Kingston offers various engineering, programming and systems architecture courses—plus special seminars.

Kingston as a place to live.

Situated in the midst of one of the most popular vacation meccas in the Northeast, the Kingston area offers a wide range of both summer and winter recreational activities. Anglers, climbers, canoers and hang-glider enthusiasts have ample opportunity to pursue adventure. The Catskill and Adirondack mountains provide beautiful settings for hiking, backpacking, camping and hunting. In the winter, some of the finest skiing in the east is available at nearby ski resorts.

The arts are alive and thriving in the area. The Woodstock Playhouse, one of the oldest summer stock theaters in New York, provides an opportunity to see famous professional actors and some of the world's finest dancers.

IBM Corporation
Manager of Professional Recruiting
740 New Circle Road N.E.
Lexington, Kentucky 40511
(606) 232-2000

Mission, products and technologies.

IBM Lexington develops and manufactures typewriters, electronic typewriters, office printers and related supplies. The site also has worldwide engineering responsibilities for these products. Established in 1956, the Lexington plant has become one of the largest typewriter and supplies manufacturing facilities in the world.

Products manufactured include the "Selectric" family of typewriters and related supplies. Technologies utilized include: non-impact printing processes suitable for typewriter applications, computer-aided design for assisting in the development of mechanical designs, VLSI (Very Large Scale Integration) design for Lexington products, robotics and automation of the manufacturing process, non-solvent based chemical process development and software engineering techniques for defect-free product software.

Local discipline usage.

Computer science/computer engineering graduates find opportunities in architecture and microcode development for microprocessor controlled products; application of computer science techniques in the areas of operations research, software engineering and graphics; scientific programming; user and systems support programming in a multiple CPU virtual systems environment and software development for computer-aided design and automated manufacturing.

Electrical engineers at IBM Lexington contribute to activities that involve both design and utilization of systems and subsystems, microprocessors, custom LSI components, discrete and integrated digital and analog circuits, electromechanical interfaces and many facets of computer supported design tools.

Manufacturing engineers develop and support manufacturing processes to maximize quality and minimize cost for high volume electro-mechanical products. Robotics and automated manufacturing equipment must be defined and the total process developed and implemented. Microprocessors, pneumatics and hydraulics are used for equipment control and functional test.

Mechanical engineers find typical assignments in design, analysis and testing of high speed mechanical and electromechanical mechanisms. Skills in dynamics, vibrations, kinematics, automatic controls, robotics, strength of materials, instrumentation and fluid mechanics are utilized. Computer-aided techniques are used for modeling, development, testing and optimizing designs.

Chemistry/chemical engineering/materials science/metallurgical engineering graduates are involved in material synthesis, formulation, analysis/characterization and methods development. Additional areas include process/product development, product instrumentation and process control with emphasis on disperse phases, surface phenomena and organic coatings.

Educational opportunities.

The graduate work study program with the University of Kentucky offers opportunities for graduate level study in engineering, computer science and chemistry. The tuition refund program is available with Transylvania University, UK and nearby colleges and universities which have an MBA and other programs.

Lexington as a place to live.

Lexington is located in the heart of the Bluegrass region of Central Kentucky, surrounded by white picket-fenced horse farms and tobacco fields. A fast-growing metropolitan area, Lexington has an estimated population of 215,000. There are numerous well-developed subdivisions located in virtually all areas in and around the city. In addition, there are ample apartments, townhouses and rental properties. The Fayette County School System boasts many fine primary and secondary schools. The region has been influenced positively by the presence of the University of Kentucky, Transylvania University and well known theological seminaries. Cultural opportunities in Lexington include the Lexington Philharmonic Orchestra, an active council for the arts which sponsors a local ballet company, touring Broadway shows held in the recently renovated Lexington Opera House and frequent arts programs sponsored by the University of Kentucky.

IBM Corporation
Manager of Professional Recruiting
9045 Lincoln Blvd.
Los Angeles, California 90045
(213) 642-1301

Mission.

To identify, define and size future systems and system applications and demonstrate new system concept feasibility via advanced technology development.

Local discipline usage.

Computer science, computer engineering, mathematics and statistics disciplines are used at the Scientific center as it conducts applied research in the areas of application development methodology, advanced graphics, data base technology, distributed systems and building energy management.

Educational opportunities.

Universities in the Los Angeles metropolitan area that offer a wide range of undergraduate and graduate study programs in engineering, mathematics, computer science and physics include the University of Southern California, the University of California at Los Angeles, the California Institute of Technology and the California State University with campuses in Los Angeles, Long Beach and Northridge.

Los Angeles as a place to live.

As the third largest population center in the United States, the Los Angeles area contains a wide range of housing accommodations and recreational opportunties. The area enjoys a growing economy, a cosmopolitan population and a spirit of innovation. Los Angeles is one of the major centers of the information industry. The area has nationally recognized centers of art and culture, and major business, scientific and industrial organizations. The mild, dry climate provides for year-round ocean, mountain, sport and recreation activities.

IBM Corporation
Manager of Professional Recruiting
9500 Godwin Drive
Manassas, Virginia 22110
(703) 367-2121

Mission, products and technologies.

The mission of IBM Manassas is the design, development, assembly, integration, test and logistic support of militarized systems for shipboard and defense applications—as well as design, development, manufacturing and test of LSI (Large Scale Integration) circuit components plus VHSIC (Very High Speed Integrated Circuits) for advanced military applications.

Products include integrated submarine combat systems, digital sonar systems, trainers and training systems, signal processing hardware, software and microcode militarized data processors including application and support software, militarized mass storage equipment, displays and advanced semiconductor devices.

Technologies, used include system, processor and software architecture, distributed systems, data base networks, diagnostics/fault isolation, system performance monitoring, digital signal processing, active and passive sonar, semiconductor devices and processes, mechanical and electrical packing and microprogramming.

Local discipline usage.

Chemistry/chemical engineering—Design, development, testing, materials evaluation and operation of pilot line and automated manufacturing processes and processing systems for high density silicon devices used in military applications.

Computer science/computer engineering—Realtime digital computer and digital signal processor system, hardware and software architecture requirements analysis and design; operation system, mathematical computation, diagnostic, simulation and support software design; programming; processor and software system test, integration, installation and operational support.

Electrical engineering—System requirements analysis and architecture design; large scale system engineering and integration; design, development and test of a variety of components, equipment and systems; input/output equipment and distributed system data bases; reliability, availability, maintainability engineering; logistic support engineering; electrical facility design; computer signal processor detection.

Industrial engineering—Planning, estimating and monitoring manufacturing and product costs; productivity assessment; design-to-cost planning, estimating and monitoring; design, modernization and maintenance of plant facilities and development of advanced cost estimating models and methodologies.

Mathematics/statistics—Signal processing, tracking and localization algorithm analysis, design and development. Also system performance analysis, prediction and modeling.

Mechanical engineering—Thermal, structural, acoustic and environmental analysis; design, development and test of packages for LSI semiconductor and gallium arsenides devices, printed circuit wiring boards and mechanical enclosures for military products; design of automated manufacturing processes including robotics.

Physics—Analysis, design, development and test of semiconduction and gallium arsenide devices, design automation tools and techniques, processes and processing systems; materials and device evaluation; submicron lithography development.

Opportunities are also available for graduates in *materials science and metallurgy/metallurgical engineering.*

Educational opportunities.

The University of Virginia conducts a program at the Manassas facility leading to a Master of Science in electrical engineering or computer science. In addition, personnel employed in the Manassas facility have access to universities located in the Washington, D.C. area, such as American, Catholic, Georgetown, George Washington, Howard and Maryland, that offer undergraduate and graduate study programs in engineering, mathematics, computer science, and physics.

Manassas as a place to live.

Manassas, with a population of about 25,000, offers a blend of Virginia country atmosphere and residential living. Historical landmarks from the Revolutionary and Civil Wars dot the landscape. Personnel located at the Manassas facility, about 35 miles from Washington, D.C., also have ready access to city, suburban and rural living and a wide range of cultural opportunities provided by proximity to Washington, D.C., such as the Smithsonian Institution, Kennedy Center and Wolf Trap Farm Park for the Performing Arts.

IBM Corporation
Manager of Professional Recruiting
Bodle Hill Road
Owego, New York 13827
(607) 687-2121

Mission, products and technologies.

The design, development, integration, test, manufacturing and logistic support of militarized systems for airborne, spaceborne, shipboard and ground-based applications.

Products manufactured are militarized computers, data communication systems, electronic countermeasure systems, electromagnetic tracking systems, integrated shipboard and avionics systems, navigation, guidance, weapon delivery systems and anti-submarine warfare systems.

Technologies used include system, processor and software architectures, distributed systems, data bases, diagnostics/fault isolation, digital signal processing for acoustic and electromagnetic systems, electronic countermeasures, power supplies, test equipment, automated manufacturing/robotics, aircraft navigation, guidance, weapon delivery, mechanical and electrical packaging and microprogramming.

Local discipline usage.

Chemistry/chemical engineering—Design, development, testing, materials evaluation and operation of automated manufacturing processes and processing systems for printed circuit wiring boards used in commercial and military applications.

Computer science/computer engineering—Realtime digital computer system, system architecture requirements analysis and design; operating system, mathematical computation, diagnostic, simulation and support software design and development; programming; computer and software system test, integration, installation and operational support.

Electrical engineering—System requirements analysis and architecture design; large scale system engineering and integration; design, development and test of a variety of components, equipment and systems; reliability, availability, maintainability engineering; logistic support engineering; computer and signal processor algorithm design.

Industrial engineering—Planning, estimating and monitoring manufacturing and product costs; productivity assessment; design-to-cost planning, estimating and monitoring; make/buy analysis; design, modernization and maintenance of plant facilities.

Mathematics/statistics—Signal processing, tracking and localization algorithm analysis, design and development; system performance analysis, production and modeling.

Mechanical engineering—Thermal, structural, acoustic and environmental analysis; design, development and test of packages for semiconductor devices, printed circuit wiring boards and mechanical enclosures for military products; design of automated manufacturing processes including robotics.

Physics—Test and evaluation of materials for printed circuit wiring boards; design, development and test of antennas and microwave integrated circuits; computer programming for mathematical and scientific computations.

IBM Owego also has opportunities for *metallurgy/metallurgical engineering* disciplines.

Educational opportunities

Syracuse University conducts a program at IBM facilities close to Owego leading to advanced degrees in engineering and computer science. Similar undergraduate and graduate study programs are available through the nearby State University of New York at Binghamton as well as Cornell University and Ithaca College located about one hour's drive from the Owego facility.

Owego as a place to live

Owego is within an hour or two of New York's Finger Lakes and Great Lakes regions and Pennsylvania's Pocono Mountains. The area provides excellent opportunities for outdoor recreation including hunting, fishing, hiking, skiing, ice skating and camping.

Cultural attractions include the local Broome County Opera Society, Summer Savoyards, Pops Orchestra, ballet and theater companies.

IBM Corporation
Palo Alto Scientific Center
Center Manager
1530 Page Mill Road
P.O. Box 10500
Palo Alto, California 94304
(415) 855-3124

Mission

To explore the use of computers for advanced applications in science and engineering and advise IBM and its customers on requirements in these areas.

Local discipline usage

Computer scientists analyze problems in data base design, local computer networking, compiler and interpreter design and implementation and expert systems.

Electrical engineers design and implement prototype hardware used in computer networking.

Mathematicians carry out numerical analysis involved in computer modeling of problems in seismic data analysis and reservoir simulation.

Educational opportunities

The Palo Alto Scientific Center is adjacent to Stanford University. The San Francisco Bay area also has many outstanding universities such as the University of California at Berkeley and Santa Clara University. A wide range of graduate study programs is offered by both these and other colleges and universities.

Palo Alto as a place to live

Palo Alto is located in the San Francisco Bay area 45 miles south of San Francisco and 15 miles north of San Jose. Situated in "Silicon Valley," it provides an excellent social and cultural environment. Recreational opportunities lie within easy driving time and include hiking and skiing in the Sierra Nevada Mountains, diving and surfing in the Pacific Ocean and sailing on San Francisco Bay. The weather is mild, with no rainfall during the summer and infrequent frost in the winter.

IBM Corporation
Manager of Professional Recruiting
South Road
Poughkeepsie, New York 12602
(914) 463-1234

Mission, products and technologies

Poughkeepsie is the development and manufacturing center for IBM's largest systems, with primary emphasis on high-performance products, programming systems and support products. It also supplies computer components, including logic and selected memory technologies used in products manufactured at this site and other U.S. locations. Poughkeepsie is a leading-edge developer of central processors using VLSI (Very Large Scale Integration) technology.

Local discipline usage

Chemistry/chemical engineering—Determination of analytical real time process controls for complex plating baths, cleaning solutions, chemical coolant and other process chemicals; design of cleaning techniques for micro-circuitry components and packaging; analytical work in the design of highly complex processing techniques; engineering and design of systems to deliver, control and dispose of large quantities of pure chemicals in a high volume production line.

Computer science, mathematics, statistics—Systems programmers plan, design, develop, test, document and evaluate the performance of IBM's largest programming systems. Application programmers develop and install a wide range of scientific and business program applications for use within the company. Mathematics majors with computer science options can enter the programming field in either development or applications programming.

Electrical engineering—Logic and digital circuit design; microcode development; processes and equipment for testing new products; computer logic and system design; development of power systems for power supplies, distribution analysis and monitoring and control systems; electronic package integration; analysis of large processor interaction with the customer's environment.

Industrial engineering—Development and presentation of data for cost analysis; economic justification of investment decisions to make or buy; determination of plant capacity, manpower, measurement standards and materials handling equipment.

Materials science—Analysis and engineering support for the selection and characterization of materials to be employed in future computer systems; development of new material applications that will result in improved computer system performance and reliability.

Mechanical engineering—Design, including the use and development

of processor packages, including frame structure, support mechanisms, connectors, cables and covers of computer design to ensure mechanical feasibility; design of assembly processes; design and development of heat-transfer mechanisms and control subsystems and the development of optimum work-space layouts.

Metallurgy—Conception and design of solder re-flow systems for LSI packaging; engineering input to package design for material selection and sealing technique; microweld and brazing metallurgical studies and systems.

Physics—Failure and reliability analysis for memory, microprocessors, and discrete components; design of manufacturing processes and equipment involving the control of temperature and volume of gasses, metal re-flow, and content of oxidation and fatigue of metals; analysis of data from manufacturing processes involving complex physical interaction to determine the significance of measurements.

Educational opportunities

Opportunities to continue education towards a graduate degree are available at Vassar College, Marist College, Syracuse University Extension and Union College Extension—all in Poughkeepsie—as well as RPI Extension at Danbury, Connecticut, the State University at New Paltz, New York, and other universities within commuting distance. These universities offer degrees in engineering systems, chemistry, computer engineering, computer science, electrical engineering, mathematics, operation research and solid state science.

Poughkeepsie as a place to live

The Mid-Hudson area is not just a famous river valley; it is a desirable place to live, raise a family and work. In addition to varied cultural and athletic activities in the immediate Poughkeepsie area, the attractions of New York City are less than two hours by car or train.

Besides the local Hudson Valley Philharmonic and entertainment presented at the Mid-Hudson Civic Center and Bardavon 1869 Opera House, Poughkeepsie is not far from the Berkshire Music Center at Tanglewood, the Saratoga Performing Arts Center and Jacob's Pillow Dance Festival. There are several local summer theaters and community theater groups as well as the American Shakespeare Theater in Connecticut.

Among the sporting activities to enjoy are hiking along the Appalachian Trail, sailing and motor boating on the Hudson River, gliding, climbing, tennis, racquetball, skiing and golf. Professional sports include baseball, football, basketball and hockey in New York City. Army football is nearby at West Point.

IBM Corporation
Manager of Professional Recruiting
P.O. Box 10
Princeton, New Jersey 08540
(201) 329-1000

Mission, products and technologies

IBM Princeton develops, manufactures and markets IBM computer supplies and accessories and IBM Biomedical Systems.

Supplies and accessories include magnetic tape and diskettes, printer ribbons, ergonomic furniture and paper products. Biomedical Systems consist of ECG recorders and analyzers and blood products associated with cell washing for blood banks and cell separation used in treatment of blood diseases.

Technologies include magnetic media, chemical inks, paper technology, mechanical centrifuge and plastics.

Local discipline usage

Chemistry/chemical engineering assignments are found in paper chemistry, environmental control, chemical control, printing inks, blood chemistry and plastics associated with development and manufacturing functions of machine design and process development.

Computer science and mathematics/statistics. Largely associated with information systems development in support of development, manufacturing and sales. Assisting in the design of order entry, inventory control and financial reporting for high volume, high turnover products. Some computer science assignments are in support of Biomedical Systems in ECG analysis software applications.

Electrical engineering. Logic design involving machine control, microcode, microprocessors, electromechanical interfaces, test equipment and process control—in addition to reliability and serviceability, electrical packaging, procurement, quality engineering and production control.

Industrial engineering. Activity includes manufacturing process evaluation and design distribution system design, plant layout and cost estimating.

Mechanical engineering. Developing machines to process blood for washing and separation involves centrifuge design, fluid connections, mechanical and electrical packaging. Automation in high volume production equipment is involved in magnetic diskette and ribbon manufacturing.

Educational opportunities

Numerous fine universities and colleges within easy driving distance of central New Jersey offer graduate degrees in engineering and computer science. These include Princeton, Rutgers and Rider in New Jersey; Columbia, N.Y.U. and Polytechnic Institute of New York in New York City, and the University of Pennsylvania, Temple and Drexel in Philadelphia.

Princeton as a place to live

Located in a rural setting in central New Jersey, the Princeton site combines a country atmosphere with easy access to the major metropolitan areas of New York and Philadelphia. Possibilities for leisure activities range from the beaches to the mountains, from sailing to snow skiing, from a quiet walk in the country to a night in an Atlantic City resort.

IBM Corporation
Manager of Professional Recruiting
P.O. Box 12195
Research Triangle Park,
North Carolina 27709
(919) 543-5221

Mission, products and technologies

Develop and manufacture communications, retail and distributed data processing systems and products as well as provide necessary programming, systems architecture and technological subassemblies for these products.

Principal Raleigh products are point-of-sale terminals and store subsystems; general purpose terminals; keyboard displays, printers, batch and graphic display terminals; distributed processing systems; text and office systems; telecommunications systems; front-end processors; modems; and communications systems programming. Advanced communication technologies used include computer interconnection, information control and flow; data base distribution; packet, message, circuit and hybrid switching; networking; acoustic and electromagnetic media, satellites, analog and digital data processing and transmission.

Local discipline usage

Chemical engineering and Materials Science—Materials and process development in materials laboratory, semiconductor processing, process studies and equipment specifications for holographic devices, semiconductor devices and module packaging; plastics molding; chemical systems design; environmental monitoring.

Computer science—Product definition; system design and architecture; development and verification of application, diagnostic, communication and device control programs; application of low-level programming techniques to the design, coding and testing of microprogrammed routines.

Electrical engineering—Digital and analog logic and circuit design; functional and performance testing of products; simulation; microcode development; power systems design; development of test strategies for products in the manufacturing process; development of unique test devices and systems.

Industrial engineering—Resource planning; design and development of bid proposals that provide necessary physical facilities for the site.

Mechanical engineering—Packaging design; mechanism design and implementation; development of test strategies for products in the manufacturing processes; development of unique test devices and systems.

Educational opportunities

North Carolina's Research Triangle gets its name from the geographic triangle formed by three major universities. The university of North Carolina at Chapel Hill is the nation's oldest state university. Duke University, renowned nationwide for its excellence, is located in Durham. And Raleigh is the home of North Carolina State University as well as other institutions of higher learning such as Meredith College, Shaw University and St. Augustine's University.

The triangle area as a place to live

The Research Triangle Park is the hub of one of the most inviting residential areas in the nation. Raleigh is the capital of North Carolina and the seat of state government. An All-American city, Raleigh is the home of the state's internationally known Museum of Art, the Annual State Fair, and the N.C. Symphony and Pops concert series. Durham is host to the Sarah P. Dukel Memorial Gardens, the Duke University Chapel, the American Dance Festival and the N.C. Museum of Life and Sciences, which features pre-historic exhibits, a nature library, a zoo and an aviary. Chapel Hill features the Morehead Planetarium, where U.S. astronauts receive training in celestial navigation, and several charming and inexpensive restaurants. The area also offers numerous athletic events including ACC basketball and football and international golfing championships. The Triangle area has the advantage of a mild climate with four distinct seasons. Combine that with the scenic 300 mile eastern coastline and the Blue Ridge and Great Smoky Mountains and you'll find year-round outdoor activities including skiing, hang-gliding, fishing and sailing.

IBM Corporation
Manager of Professional Recruiting
Highway 52 and NW 37th Street
Rochester, Minnesota 55901
(507) 286-2324

Mission, products and technologies

IBM Rochester develops and manufactures small commercial data processing systems—including systems-related programming—plus general terminal and disk storage systems. The site designs and builds engineering model semiconductor devices, the prototypes of chips to be manufactured in volume for IBM products. Rochester also develops and manufactures head and disk storage devices.

Local discipline usage

Computer science/computer engineering graduates keep pace with state-of-the-art programming, developing and testing a complete range of program offerings from compilers, utilities and control language programs to meeting challenges in relational data base concepts, menu-driven services and screen management of data and data formats. Computer engineers apply microprocessors to real-time process control and test equipment used to manufacture IBM systems. Programmers also design, code, test, install and maintain IBM application programs that serve the site, from financial analysis to production control.

Electrical engineers continually advance the leading edge of LSI (Large Scale Integration) circuitry, advanced power systems, and new memory technologies. Assignments range from developing, implementing and testing various system components to creating sophisticated test data using advanced equipment, and developing and designing automated process and test equipment used to manufacture IBM products.

Industrial engineering/manufacturing engineering graduates provide vital support to manufacturing. Industrial engineers help in planning and cost control, including load forecasting, manpower and space requirements, scheduling, strategic manpower and product cost planning, sourcing evaluations and cost targeting. Manufacturing engineers identify, develop and implement proper methods, processes, tools and equipment for the manufacture of a wide range of components and assemblies. They develop logistics and manufacturing processes, tooling concepts, equipment specifications, equipment justifications and manufacturing estimates for new products and proposed product changes.

Mechanical engineers are key in solving design, process and logistics problems. Responsibilities include complex engineering analysis and experimentation in developing new equipment designs for product development, new production techniques and highly mechanized processes.

Chemists/chemical engineers, materials scientists, metallurgists and metallurgical engineers and physics graduates provide critical analysis in support of materials and process work in laboratory and manufacturing environments.

Educational opportunities

A program called UNITE (University/Industry Television Education) is sponsored by IBM and conducted by the University of Minnesota. Through UNITE, a Master's Degree in electrical engineering or computer science can be earned during company time. Noncredit college level application-oriented courses taught by IBM instructors are also available. During nonworking hours, the Higher Education Consortium, a cooperative arrangement among institutions of higher learning in southeastern Minnesota, offers courses and degrees to residents of the area.

Rochester as a place to live

Rochester is the fifth largest city in Minnesota with a population of approximately 60,000. It is located on gently rolling hills about 40 miles west of the Mississippi River and 75 miles southeast of the Twin Cities of Minneapolis and St. Paul. Rochester is noted for its wide variety of educational, recreational, cultural and entertainment activities—all of which contribute to the high quality of life enjoyed by the Rochester resident.

The Rochester Public School system—long regarded as one of the finest in Minnesota—has 17 elementary schools, 3 junior high schools and 2 senior high schools. Several parochial elementary schools and one parochial high school also serve the community.

Whatever your recreational preference, you will probably find it in and around Rochester. There are indoor and outdoor tennis courts; racquetball facilities; swimming pools and skating rinks; organized baseball, basketball, football, soccer and hockey programs; numerous camping facilities; nearby hunting areas and lakes and rivers for boating, fishing and waterskiing. Rochester has over 1,200 acres of city park land and several beautiful 18-hole golf courses.

IBM Corporation
Manager of Professional Recruiting
5600 Cottle Road
San Jose, California 95123
(408) 256-2924

Mission, products and technologies

IBM San Jose develops and manufactures direct access storage devices and associated control units using the latest advances in magnetic and semi-conductor technology. The site is responsible for disk storage technology development, including mechanical and electrical design of direct access storage devices, microcode development and design of very large scale integrated circuits. Technology is continually improved with innovations such as film recording heads and highly integrated microprocessors.

Component design and process development are carried out for magnetic recording heads and disks, head air bearing design, suspension systems, and magnetic bubble devices. Process technologies utilized include photolithography, vacuum deposition, electroplating, chemical and vacuum etching, polymeric binder formulation, coating technology and precision machining.

Local discipline usage

Chemistry and chemical engineering graduates are involved in materials development, processing and analysis. Areas of particular interest are polymeric binder systems, vacuum deposition, electrochemistry, instrumental analysis, microchemistry, surface chemistry and emulsions.

Computer science and computer engineering graduates work in the areas of language, compilers, data base, data access and interactive program products. They also do development programming for applications in manufacturing, engineering, finance and logistics.

Electrical engineering graduates find assignments in the design, development, testing and manufacture of storage products. These include work in design and analysis of magnetic recording equipment, digital and analog circuit design, microprogramming, simulation, servo systems, signal processing and reliability.

Industrial engineering graduates are involved with human resource planning, facilities planning, plant layout, workload forecasting and manufacturing capacity planning.

Materials science, ceramic engineering, metallurgy and metallurgical engineering graduates are involved in the analysis of dimensional and thermal stability of materials, properties of film materials, failure analysis and organic binder systems.

Mechanical engineers find their discipline fundamental to the design and development of direct access storage devices. They get involved in design and analysis of device mechanisms, head slider air bearing design, tribology, packaging, design of mechanical tools and test equipment, mechanization and dynamics.

Physics graduates get involved in solid state physics of semi-conductors and magnetic materials, magnetic recording processes and failure analysis.

Educational opportunities

IBM participates in programs at the graduate level at Stanford University, the University of Santa Clara and San Jose State University. Special arrangements may be made with graduate schools at other universities in the area, such as the University of California at Berkeley and at Santa Cruz. Together with state and city colleges in the vicinity, these institutions provide a wide range of quality education for all residents.

San Jose as a place to live

San Jose, a growing city of over 600,000 people, is located some 40 miles south of San Francisco. With its attractive climate, its concentration of government, university and industrial research and development, Santa Clara County has grown to become the electronics capital of the world.

According to the 1980 census, San Jose was the fastest growing major city in the U.S. during the 1970s. The West's oldest symphony—formed in San Jose in 1860—now plays at the Center for the Performing Arts. There are also other theater facilities.

Within the immediate area one can enjoy swimming, sailing, hiking, fishing and other sports. The Pacific Ocean is a 45-minute ride over the mountains, Carmel and the Monterey Peninsula just 75 miles away. Scenery and skiing offered by the High Sierras, Lake Tahoe and Yosemite are within a few hours' travel time. The area is characterized by excellent primary and secondary schools.

Manager of Personnel
San Jose Research Laboratory
5600 Cottle Road
San Jose, CA 95193
(408) 256-3244

Mission and research activities

The San Jose Research Laboratory is part of the Research Division, which has its headquarters in Yorktown Heights, N.Y. San Jose's mission is to conduct research in scientific fields basic to IBM's technologies and the uses of computers; to do advanced work in the technologies used in IBM products; and to explore alternative technologies to the ones presently in use.

Among the areas of science investigated at the San Jose Research Laboratory are:

Materials research—synthesis and study of polymers, conducting polymers, radiation chemistry, crystallography
Scientific computations

Advanced projects include:

Storage—recording media, access devices, recording channels, magnetic bubbles, optical storage
Input-output—optical materials, holographic optics, electrophotography, displays
Data bases—relational data base theory and implementation
Image processing

Local discipline usage

While primary needs are at the doctoral level, opportunities also exist for master's and bachelor's degree graduates.

Computer scientists and mathematicians work in areas such as database theory, programming technology and image processing.

Materials scientists, physicists, chemists and metallurgists do research in such areas as polymer science, thin film science, surface studies, radiation chemistry and structure determination.

Electrical engineers and solid state scientists, including ceramic engineers, work in the areas of storage technology and magnetic recording devices.

IBM Corporation
Manager of Professional Recruiting
555 Bailey Ave.
San Jose, California 95150
(408) 265-2924

Mission, products and technologies

Situated six miles south of the main San Jose site, IBM Santa Teresa designs, develops, tests and maintains a variety of programming products used by IBM customers. The laboratory is responsible for the design, development, testing and packaging of computer programming in such areas as languages, interactive programs, data base management, data communication and data storage management. To do this work, programmers use a variety of powerful tools, including extensive computing facilities, advanced design concepts, high-level coding language and programs for code analysis. The laboratory carries out significant work in the examination, definition and refinement of the programming process. This work includes important technology programs to investigate design languages and methodologies as well as metrics related to programming

Local discipline usage

Computer science and mathematics majors are needed to design, develop and test computer programming in such areas as languages, interactive programs, data base management, data communication and data storage management.

Educational opportunities

IBM participates in programs at the graduate level at Stanford University, the University of Santa Clara and San Jose State University. Special arrangements may be made with graduate schools at other universities in the area, such as the University of California at Berkeley and at Santa Cruz. Together with state and city colleges in the vicinity, these institutions provide a wide range of quality education for all residents.

Santa Teresa as a place to live

The San Jose area is located some 40 miles south of San Francisco. With its attractive climate, its concentration of government, university and industrial research and development, Santa Clara County has grown to become the electronics capital of the world. According to the 1980 census, San Jose was the fastest growing major city in the U.S. during the 1970s. The West's oldest symphony—formed in San Jose in 1860—now plays at the Center for the Performing Arts. There are also other theater facilities.

Within the immediate area one can enjoy swimming, sailing, hiking, fishing and other sports. The Pacific Ocean is a 45-minute ride over the mountains, Carmel and the Monterey Peninsula just 75 miles away. Scenery and skiing offered by the High Sierras, Lake Tahoe and Yosemite are within a few hours' travel time. The area is characterized by excellent primary and secondary schools.

IBM Corporation
Manager of Professional Recruiting
P.O. Box 700
Suffern, New York 10901
(914) 346-2000

Mission, products and technologies

Development and service of computer-based business information systems used by IBM locations throughout the world. Primary responsibilities are: (1) development and maintenance of a central manufacturing information system and central product logistics system. (2) support of company production requirements through the processing of engineering, manufacturing planning and financial data used by IBM locations in the U.S. and overseas.

Local discipline usage

Computer science duties involve responsibility for analyzing requirements, designing, developing, testing, maintaining, installing and operating a variety of systems and applications that control massive volumes of IBM business and technical information. Among the more heavily used programming languages are APL, PL-1, FORTRAN, COBOL, BASIC and ASSEMBLER.

Educational opportunities

A number of universities in the New York City, Westchester and Northern New Jersey areas—including New York University, Pace, Iona, Rutgers, Columbia, Fairleigh Dickinson University and Polytechnic Institute of New York—offer challenging graduate programs in computer science, information systems and related disciplines. They also offer an MBA program.

Sterling Forest as a place to live

Sterling Forest is a unique location that offers the joys of outdoor living and close proximity to New York City. Recreational opportunities are plentiful. The area has many lakes and rivers for fishing and swimming. At the same time, it is only a short trip to beaches on Long Island or the New Jersey Shore. Historic sites, including West Point and Washington's Headquarters, are open to the public. The Catskill and Adirondack Mountains are just a short trip away.

Within an hour's drive are the cultural and entertainment attractions of New York City. Theaters, sporting events, museums and galleries can match almost any sphere of interest. Numerous fine restaurants offer cuisine from around the world.

IBM Corporation
Manager of Professional Recruiting
3405 W. Buffalo Ave.
Tampa, Florida 33630
(813) 872-3752

Mission, products and technologies

IBM Tampa is responsible for the development, implementation and maintenance of a systems network required to meet internal IBM data processing needs. This network will link terminals and processors in a number of regional and headquarters locations throughout the country. In addition, business systems are being developed for use on the network.

The site is involved in advanced networking installation and operation, as well as program architecture and design. A variety of operating systems, programming language and other software products is used.

Local discipline usage

Computer science, mathematics and electrical engineering graduates work in design, program development, systems installation and performance analysis with data networks, control programming, subsystems and access methods. These positions utilize the latest hardware and software technology in systems and data communications.

Educational opportunities

The University of South Florida in Tampa offers a graduate level degree in computer science. Other courses are available at the undergraduate and graduate levels.

Tampa as a place to live

The third largest city in Florida, Tampa is one of the fastest growing areas in the Southeastern U.S. It is a manufacturing and agricultural center, and the nation's eighth largest port in tonnage.

The city enjoys a beautiful geographic setting, bordered on the south and west by Upper and Old Tampa Bays. In addition, since it is located on the "Suncoast," Tampa residents enjoy hours of sunshine unmatched anywhere else in the state and a climate with an average annual temperature of 72 degrees.

For leisure and enjoyable living, Tampa offers a wide range of social and cultural activities, including excellent boating and swimming facilities and a fine symphony orchestra. Disneyworld and Seaworld are 70 miles away, and Busch Gardens, Florda's second largest tourist attraction, is located in the heart of the city. The host of Super Bowl 1984, Tampa is a haven for sports enthusiasts. Professional football and soccer draw large crowds as the Tampa Bay Buccaneers and the Tampa Bay Rowdies battle the best teams in the nation. In addition, numerous professional baseball teams reside in the bay area for spring training and exhibition games. Other spectator sports popular in the Bay area include greyhound and horse racing and Jai Alai.

IBM Corporation
Manager of Professional Recruiting
P.O. Box 13190
Tucson, Arizona 85732
(602) 741-6387

Mission, products and technologies

The Tucson facility develops, tests and manufactures magnetic tape drives, magnetic tape, mass storage systems and high-speed laser electrophotographic system printers. Tucson also manufacturers small capacity direct access storage devices and assembles printed circuit cards.

Advanced magnetic recording technology is applied to electrical and mechanical design and development of recording systems, logic microcode recording heads and magnetic tape. Laser electrophotography is used in developing high speed non-impact printers. A broad spectrum of chemical, mechanical and film process technologies is employed along with state-of-the-art work in electronics, LSI (Large Scale Integration), tape drive mechanics and error correction and recovery.

Local discipline usage

Chemistry and chemical engineering graduates work in organic coating formulations and processes, plating, materials development and specifications, organic binders and substrate development, magnetic particle development and dispersions. Physical, organic and analytical chemists also get involved in polymers, surface chemistry and electrochemistry.

Computer science graduates get involved in logic design, digital circuit design and implementation and maintenance of system control programs as well as programs products.

Electrical engineers work in design and analysis of magnetic recording components, analog and digital circuit design, design of logic functions, microprogramming and simulation.

Industrial engineers are involved in human resource planning, facilities planning, plant layout, workload forecasting and manufacturing capacity planning.

Materials science, metallurgy and metallurgical engineering graduates as well as *ceramic engineers* work with ceramic materials, polymers and metallurgical systems in connection with materials and process development and failure analysis.

Mechanical engineers are involved in development of products and systems for flexible magnetic media, mechanical processes, tool development, tribology and wear, fluid dynamics and servomechanisms.

Physics graduates find challenges in areas such as magnetism, magnetic recording, optics and applied mechanics.

Educational opportunities

Tucson is the home of the University of Arizona, which offers bachelor's, master's and doctoral degrees in major engineering and scientific disciplines as well as related fields of study. In addition to on-campus study programs, IBM personnel can take advantage of the Interactive Educational Television System developed by the university's engineering college for off-campus participation in classroom activities and dialogue with instructors and fellow students.

Tucson as a place to live

Just 65 miles north of the Mexican border, Arizona's second largest city is virtually surrounded by rugged mountain terrain offering riding and hiking trails and the opportunity to traverse all forms of landscape, from desert to lush tundra. In and around Tucson itself are almost unlimited opportunities for fishing, horseback riding, hiking, camping, tennis, baseball, golf and a host of other outdoor activities.

The University of Arizona serves as a cultural center, complete with museum and art exhibits, theaters and concerts. The city's resident opera company, theater company and symphony orchestra enhance the cosmopolitan atmosphere. The Tucson Community Center offers a wide range of stage attractions, including productions, plays, concerts, circus, ice shows, sporting events and exhibitions.

IBM Corporation
Manager of Professional Recruiting
2625 Townsgate Road
Westlake, California 91361
(805) 497-5151

Mission, products and technologies

IBM Westlake's mission is the design, development, integration, test and operational support of ground-based and spaceborne systems for military space programs.

Products manufactured include large commercial and militarized data processing systems, application and control software for spacecraft command, control, communications, data base management, detection, trajectory estimation and prediction and sensor signal processing.

Some of the technologies utilized are data processing system, hardware and software architecture, satellite telemetry data handling, digital sensor signal processing algorithms, trajectory estimation and prediction algorithms, graphic display generation, diagnostics and system integration.

Local discipline usage

Computer science/computer engineering—Realtime digital computer and digital signal processor system architecture requirements analysis and design; operating system, mathematical computation, diagnostic, simulation and support software design; programming; processor and software system test, integration, installation and operational support.

Electrical engineering—System requirements analysis, architecture definition, design, development, test, integration and operational support of hardware and software systems employing large scale commercial and militarized data processing, signal processing, communications and display equipment; signal and data processing algorithm analysis and design.

Industrial engineering—Design, modernization and maintenance of office and laboratory electrical, heating and air conditioning facilities.

Mathematics/statistics/physics—Precision spacecraft trajectory estimation, prediction and control algorithm design; signal processing algorithm design and development; computer programming for mathematical and scientific computations.

Mechanical engineering—Spacecraft and ground-based electronics thermal, structural and installation requirements analysis.

Educational opportunities

Universities in the Los Angeles area that offer a wide range of undergraduate and graduate study programs in engineering, mathematics, computer science and physics include the University of Southern California, University of California at Los Angeles, California State University at Northridge and University of California at Santa Barbara.

Westlake as a place to live

Westlake is located in the Conejo Valley area of southeast Ventura County, just 39 miles northwest of Los Angeles. With its location, inviting year-round climate and country setting, the Conejo Valley is viewed as one of the most desirable places to live in California.

Personnel assigned to Westlake can enjoy living conditions ranging from city to suburban to rural. Nearby Los Angeles provides numerous cultural opportunities.

Manager of Professional Recruiting
Thomas J. Watson Research Center
P.O. Box 218
Yorktown Heights, New York 10598
(914) 945-2494

Mission and research activities.

The T.J. Watson Research Center is the headquarters of the Research Division. Another part of the division is located in San Jose, California, and there is a third laboratory in Zurich, Switzerland. Scientists in the Research Division work in fields basic to IBM's technologies and the uses of computers. They do advanced work in the technologies used in IBM products, and they explore technologies alternative to the ones presently in use.

Among the many areas of science investigated at Yorktown Heights are:

Thin films, surfaces and interfaces
Cooperative phenomena—superconductivity, magnetism.
Materials science—structure, defects, electronic structure.
Theory and practice of computation—complexity, cryptography, numerical methods.
Lasers and laser spectroscopy, chemical dynamics, fundamental studies in mathematics and physics.

Advanced projects include:

Silicon technology—FET and bipolar devices, lithography, materials and processing for micron and sub-micron VLSI. Alternates to silicon, such as Josephson technology, are also studied.
Communications—signal processing, data networks, satelite communications, fiber optics.
Systems architecture—high end machines, storage hierarchies, operating system restructure for better performance.
Performance evaluation—systems laboratory to measure performance.
Data bases—studies of and implementations of relational data bases, distributed data bases.
Software technology—compilers, software development methodology.
Office systems.
Input-Output Devices—displays, printers, speech recognition.
Computer applications—automated assembly.

Local Discipline Usage

While primary needs are at the doctoral level, opportunities also exist for master's and bachelor's degree graduates.

Computer scientists, electrical engineers and mathematicians work in areas such as systems architecture, performance modeling and evaluation, queueing theory, communications, signal processing, database design, programming, computer design and networking.

Materials scientists, physicists, chemists and metallurgists do research in such areas as thin film science, superconductivity, magnetism, materials science, theoretical physics and chemistry, memory and storage research, and display and printer materials.

Electrical engineers and solid state scientists, including ceramic engineers, work in the area of semiconductor technology, including device and circuit design, photon and electron optics, and surface and interface studies.

Mechanical engineers find challenging opportunities in the engineering support areas.

Educational Opportunities

Numerous colleges and universities in the area offer graduate degree programs. Among the institutions are New York University, Columbia University, the Polytechnic Institute of New York, and the City University of New York. The Research education department offers an extensive array of courses each year, representing a major effort to provide an environment of continuing technical education. Lectures and seminars by speakers from university, industrial and government laboratories are a daily occurrence.

Yorktown Heights as a Place to Live

The Thomas J. Watson Research Center is located in the rolling hills and open spaces of northern Westchester County, New York.

Shopping in White Plains is a half-hour's drive from the laboratory, and all the glamor and excitement of New York City are only an hour to the south. Numerous smaller malls in the immediate area meet daily shopping needs.

The area affords many opportunities for recreation. For those who like boating and water sports, the Hudson River is 10 minutes from the Research Center, and Long Island Sound just 45. Westchester has many golf courses and tennis courts, and an excellent county park system. Hiking and rock climbing are enjoyed by many laboratory people.

The story of IBM—past, present and future—is and will be measured by the achievements of its people. Many of those achievements have established and advanced IBM's technological leadership in information processing. Some of them are highlighted here along with a recap of the exciting technologies and challenges you will find at IBM today.

Yesterday . . .

In a sense, IBM's technological leadership started with the company's founding in 1911. Under the leadership of Thomas J. Watson, Sr., the company soon focused its efforts on business machines. In the early 1930s, IBM branched out from punched card machines and time clocks to electric typewriters. In the 1940s, IBM turned to development and marketing of digital calculating equipment using electronic technology. The first general-purpose digital computer—the Automatic Sequence Controlled Calculator—was completed in 1944 and presented to Harvard by IBM. It was followed in 1948 by the Selective Sequence Electronic Calculator.

In the 1950s . . .

IBM marked the start of the nation's computing industry with the 701, the first electronic computer produced in quantity. Announced in 1952, the 701 performed 21,000 calculations per second. In 1956, IBM introduced the RAMAC (Random Access Method of Accounting and Control), the first disk storage system and forerunner of today's disk file. A year later, FORTRAN (FORmula TRANslation) was announced, the first widely used high-level programming language. FORTRAN was later adopted as an industry standard for scientific and engineering calculations.

Other achievements of the decade include the chain and train series printing technique for high speed mechanical impact printers, and the "vacuum column" mechanism for controlling the motion of the tape in a magnetic tape drive, both widely adopted in the industry.

In the 1950s, IBM also developed the SAGE (Semi-Automatic Ground Environment) computer/display system tied to the Air Force's defense radar network. IBM later produced a number of SAGE computers.

In the 1960s . . .

IBM made broad advances in information systems and products for business, government, medicine and education. In 1964, IBM introduced System/360, a new concept in computers incorporating microelectronics. The most important announcement in company history up to that time, the System/360 family of compatible processors and related software utilized Solid Logic Technology (SLT), providing switching speeds of 30 nanoseconds (billionths of a second) on half-inch ceramic substrates.

The decade also saw the first computer "channel," the fundamental method of synchronizing the flow of data into and out of large processors during computation. Cache memory was introduced in 1968. IBM also introduced APL (A Programming Language) in

the 1960s, a language designed for interactive problem-solving, and widely used by scientists and engineers. The first removable disk pack was introduced early in the decade.

In the same period, IBM pioneered in the development of office products and automation. The single-element "golf ball" printing element with changeable type styles was introduced with the IBM Selectric Typewriter in 1961. In 1964, computer technology was applied to the office with the concept of "power typing," launching the word processing industry. For the first time, typists could work at "rough draft" speed, backspace and type over errors and not worry about mistakes.

In the 1960s, IBM also built the first on-board computer for manned spacecraft, a 59-pound unit used to guide NASA's Gemini space flights. A system developed for the Federal Aviation Administration provided real-time enroute air traffic control of commercial, private and military aircraft within the continental U.S.

Digital sonar, an IBM system developed in the late 1960s, is still operational today. A derivative of the system is being installed in the Trident submarine.

In the 1970s...

IBM made further advances, particularly in microelectronics. Monolithic System Technology (MST) circuitry was announced, initially with switching times from 6 to 12 nanoseconds and a maximum of 16 circuits per module. Large Scale Integration (LSI) circuits were introduced, at first providing a maximum of 134 logic circuits per module. Continued advances in LSI circuitry and Multilayer Ceramic (MLC) circuit modules reduced switching times and packed more logic circuits per chip. In 1978, IBM introduced computer systems that used high-density memory chips capable of storing 64,000 bits of information, almost as much information as that stored in the entire memory of early room-sized computers.

IBM innovations in denser circuitry and the use of multiple layers in chip fabrication led to announcement in 1980 of the thermal conduction module in the 3081 processor, the company's densest logic circuit packaging to date. The module contains as many as 118 logic chips providing a total of 45,000 circuits, using VLSI (Very Large Scale Integration) logic circuits which operate in one to two nanoseconds.

Throughout the decade, IBM introduced hundreds of new or improved products and services—computers, typewriters, copiers, terminals, processors and programming support. The System/370 was introduced in 1970, the industry's first general-purpose business computer to use monolithic circuits in all memory and logic functions. The 4300 processors announced in 1979 included multi-layer ceramic substrates and multiple chip memory modules. IBM also announced the "Floppy Disk" early in the decade and in 1980 the 3380, a direct access storage device with film heads and a capacity of over two and one half billion characters, well over five hundred times the capacity of the original RAMAC.

Other innovations in the decade include the advancement of electron beam (E-beam) technology to improve the resolving power of electron microscopes and fabricate ultra-small electronic devices as well as an entirely new tape record-

ing method that nearly quadrupled recording density. IBM mathematicians developed a new computer technique for fast, high-resolution structural analysis of large molecules. An encipherment/decipherment algorithm developed by IBM was accepted by the National Bureau of Standards.

Developments in word processing included announcement of the IBM Correcting Selectric typewriter in 1973, the ink jet printer in 1976 and high-speed laser printing in 1979. Recently, IBM announced text proofing capability, allowing the operator to check all words in a document for spelling against a "dictionary" of 50,000 words based on an IBM-developed algorithm.

Throughout the 1970s, and into the 1980s, IBM supported the government's space program, from helping guide Apollo moon landings to support of the first reusable space shuttle—the Columbia—with five IBM guidance and control computers. In 1976 the first vehicle in the space shuttle program made its debut carrying IBM on-board flight computers.

Today . . .

Thanks to the creativity and initiative of thousands of capable scientists, engineers and programmers who have helped build the company, IBM today is an acknowledged leader in technology. Our business spans a broad range of information handling systems, equipment and services marketed to organizations of all sizes. IBM produces hundreds of separate products, including:

Electronic information processing systems for commercial and scientific use.
Sensor-based systems for use in manufacturing and such process industries as petroleum, utilities and primary metals.
Special systems to meet the needs of specific industries such as retail and banking.
Computer systems for special-purpose military and space applications.
Peripheral products used with IBM computing systems, such as printers, terminals, tape units and disk storage devices.
Electric and electronic typewriters, copiers, copier systems, magnetic media typewriters, information processing products, dictation equipment, direct-impression composing products and related supplies.
Computer Programming Products
Equipment Maintenance and Services.
Magnetic character sensing equipment and optical character readers.
Industrial products, including keyboards, input/output typewriters, power supplies and components such as printers, terminals, tape units and disk storage devices.
Products and accessories used with information processing equipment, including magnetic tapes, diskettes and cards, punched cards and paper forms.
Educational materials and services for elementary and secondary schools and colleges, testing and training materials for industry, educational and leisure-time products for home use by adults and children.
Biomedical devices and supplies.
Analytical Instruments.

To develop these products and services, IBM stands continually on the leading edge of technology. From acoustics to thermal analysis, semiconductor design to satellite transmission, distributed systems to data base management concepts, IBM people work to apply current technologies and explore new ones. From research and advanced technology through product development and manufacturing—the entire design and development cycle—IBM engineers, scientists and programmers find constant technological challenge.

In *research,* for example, IBM scientists are studying a variety of materials to understand—on an almost atom-by-atom level—the electronic, magnetic and structural properties of a variety of materials. New techniques for examining materials are being produced, including lasers that can be tuned to desired frequencies. Electron beams and X-rays are being used to fabricate ultra-small electronic circuit patterns. IBM mathematicians and scientists are studying the computational process itself, and carrying out fundamental studies in physics, chemistry, mathematics and the environmental and life sciences.

In addition, IBM people are conducting research in machine recognition of continuous human speech, making fundamental studies of programming languages, analyzing natural language and developing algorithms and programs to aid in semiconductor design. With these and countless other projects, IBM is making a significant investment in research each year.

Technological leadership is even more evident in *development,* an area employing considerably more people than pure research. The latest tools and technologies are used at each stage of product development—from requirements and planning to design, development and test release prior to manufacturing.

In semiconductor design, for example, IBM uses the latest in LSI (Large Scale Integration), VLSI (Very Large Scale Integration) and MLC (Multilayer Ceramic) technologies. Computer-aided design (CAD) and Electron-beam (E-beam) techniques are widely used. Engineers at an IBM development laboratory can find themselves using the latest in lithography technology, display technology and imaging systems—as well as IBM's advanced Engineering Design System.

In fact, IBM engineers, scientists and programmers at development locations can get involved in acoustics, human factors engineering, language programming, microcode development, optics, thermal analysis and scores of other technologies. They can help develop distributed systems, data base management systems, network architecture and terminals that make it easier to communicate with a computer. They can be involved in "office of the future" concepts such as electronic mail, teleconferencing and satellite transmission.

In *manufacturing,* IBM is equally a technological leader. The company makes wide use of manufacturing automation, incuding robotics. Tooling, process design, test equipment design, quality test and assurance—all use the latest techniques to assure the highest quality manufactured product.

IBM also remains at the leading edge of spacecraft command and control technology. IBM-developed hardware and software provide onboard and ground based data processing for NASA's Space Shuttle. The company is under contract to develop the ground-bases command and control system for the Air Force's Global Positioning Satellites system, as well as modernization of the Air Force's satellite ground control and data-handling system.

Tomorrow . . .

IBM's products and technologies of tomorrow depend on the creativity of a new generation of engineers, scientists and programmers. To help build the future, we need people in a wide range of disciplines who can take up the challenge of technological leadership and carry it through the 1980s and beyond. Speak to your IBM Recruiting Representative about a career with IBM.

Few companies can match IBM's commitment to education. In fact, one of the company's most visible characteristics is its dedication to the continuing education, development and training of employees. The prime purpose of IBM educational support is to help employees develop their skills with a view toward greater job effectiveness, satisfaction and advancement. Much of the company's educational effort centers upon on-the-job training. Additional training is offered through formal programs conducted inside IBM and through a large number of outside institutions.

Internal programs

Formal and informal training and education continue throughout your career at IBM and usually begin as soon as you receive your first assignment.

One of the most important programs is conducted at the IBM Systems Research Institute (SRI) in New York City, which offers graduate level study in systems science. During their 10 weeks residency at SRI, qualified students in this program can receive approximately 15 credits towards a Master's Degree in Systems Science from SUNY-Binghamton School of Advanced Technology. The IBM Manufacturing Technology Institute (MTI), a sister institute in New York City, offers graduate level elective courses in "state-of-the-art" technologies, methodologies and systems to IBM manufacturing professionals. MTI has a Robotics and Computer Aided Design/Manufacturing Laboratory for student use. Both MTI and SRI interact directly with the university community as well as IBM laboratories and plants.

At IBM lab and plant sites, extensive education programs are offered by resident professional staffs. Local universities play a key role in these education programs, many of which are at the graduate level in areas such as computer science, software engineering and manufacturing technologies.

IBM also sponsors a large number of workshops, seminars, symposiums and lectures on a wide variety of technical topics. The company encourages the writing and presentation of technical papers and reports and maintains excellent technical libraries.

A learning environment Complementing these formal internal educational programs are the atmosphere at IBM and the people with whom you associate. Anyone who works at IBM works among talented programmers, engineers and scientists in all fields. We encourage the open exchange of ideas and information among our employees. For example, any professional has access to the IBM Technical Information Retrieval Center, where an individual's interest profile automatically selects from over 20,000 abstracts of reports and papers each month. Special interest groups, such as the Interdivisional Technical Liaison Committees that bring together leading IBM experts in their field, help provide the periodic informal exchange of technical information among some 45 labs and plants around the world. We strive to make both individual and group technical assignments as challenging as possible and to structure jobs to enhance professional development.

External programs

Tuition Refund Program Under this plan, IBM will completely reimburse employees for courses taken

off company time when the courses are related to job responsibilities or career development. The purpose is to make employees more effective on the job and increase their potential for development within IBM.

Graduate Work Study Program IBM will fully reimburse employees for courses taken at the master's degree or doctoral level in a wide variety of engineering and scientific disciplines relevant to the business. Employees are also given time off from work to attend classes. Examples of such disciplines are electrical, mechanical, computer, industrial and chemical engineering; chemistry; materials science; physics; computer science; mathematics and metallurgy. This program provides employees an opportunity to learn from their work which courses will be most beneficial to performance on the job and future career development.

The Large Scale Integration Institute Operated under the auspices of the University of Vermont in Burlington, this institute provides graduate training for IBM technical professionals from all areas of the company on a selective basis. On completion of the one-year, full-time program, employees earn a master's degree in electrical engineering with emphasis on large scale integration. They gain an understanding of semiconductor design and manufacturing and a working knowledge of semiconductor technology applications.

Resident Study Program IBM provides selected employees the opportunity to pursue education in subjects of interest to the employee and IBM on a full-time basis at the most prestigious colleges and universities in the U.S.

Employees receive 75% salary and full tuition expenses to pursue their advanced degree in a reasonable time period. In addition, many employees return to work during summer or holiday recess periods to acquire new work experiences related to their course of study. The thesis topic selected is usually one that relates to the employees' and IBM's work and which will assist in future career development.

The above *internal* and *external* education programs are not all-inclusive. Many IBM locations also have programs tailored to their particular needs.

IBM became an outstanding company through the efforts of many outstanding people. It has long been the company's policy to recognize contributions and achievements that go beyond an employee's normal duties. Every year many awards are made to IBMers throughout the company, ranging from less than a hundred dollars to many thousands of dollars for a truly significant technical contribution. Awards may be earned for various kinds of innovations and inventions that offer improvements or for any other contribution that benefits the company economically or in some way adds to its value.

IBM Fellow Program To be named an IBM Fellow is to receive the highest technical honor the corporation can bestow. An IBM Fellow not only carries enormous prestige within the company, but is well known outside it. IBM Fellows are selected from among scientific, engineering, programming, systems and other technical employees. They qualify for appointment on the basis of distinguished and sustained technical achievement. An IBM Fellow keeps the title throughout his or her entire career and for the first five years has some unusual privileges and responsibilities. These include the freedom to determine one's own work project and to travel freely as needed to participate in technical and academic discourse. A Fellow also accepts certain administrative and consulting duties that may help to advance a project, and may serve as an assessor of a project's progress and success.

IBM Fellows were first appointed to this unique program in 1963, and 77 employees have earned the title to date. Fifty-one of them are active today. They work in widely diverse fields such as large data base organization, signal identification and transmission, packaging of high-density circuits, printing technology and language development.

Invention achievement awards Not surprisingly, IBM is full of inventors. Almost one half of the technical employees in the corporation have invention records. In the 1970s more than 5,600 patents were awarded to IBMers. IBM recognizes the extra effort required of its employees to prepare patent applications and technical disclosures, granting points for each patent application or publication. Points are accumulated with cash awards and certificates given for each plateau or group of 12 points. A new inventor is awarded an engraved desk pen set to mark the occasion. Those who have achieved their first plateau may be easily recognized by the jewelry which accompanies the first plateau award. Cash awards for additional plateaus may be earned throughout an IBM inventor's career. It is not unusual for some people to earn two or three awards in a single year.

Outstanding Innovation Awards Employees whose technical contributions are of significant value to the company, whether patentable or not, and which represent a teaching or concept that can be used in subsequent technical activity, may receive an Outstanding Innovation Award. These awards can range from $2,500 to $10,000 and may be earned by anyone in the corporation, provided they meet technical and concept requirements in the context of IBM's business. The most significant Outstanding Innovation Awards may be eligible for Corporate Awards, which receive additional cash grants commensurate with wider corporate use throughout the company.

Division/operating unit awards These awards recognize employees for achievements of outstanding value to IBM as measured by impact on a major business function in terms of economic and commercial value and demonstrated business leadership. As with Outstanding Innovation Awards, these awards can be as high as $10,000.

Informal awards In recognition of significant accomplishments or contributions, employees can receive informal awards. Usually given at a local level, these awards are primarily performance-oriented. The maximum amount of an award is $1,500.

Professional societies IBM encourages technical employees to join, contribute technical papers and

become active members of professional societies. The company believes such active membership provides stimulating contact and professional growth to the employee and company alike. Papers, reports and discussions by IBM employees have appeared and continue to appear in the journals, magazines and conferences of most major technical societies and associations. In addition, many IBMers are active as officers, as committee chairpersons and members and as volunteer participants in technical and professional activities. Currently, there are 10 IBMers elected to The National Academy of Sciences, 17 to membership in The National Academy of Engineering and 68 as IEEE Fellows.

In addition, many IBM locations have special recognition programs to meet their particular requirements.

Through the years, IBM has developed a comprehensive program of benefits for its employees completely paid for by the company. The program includes group life insurance and survivor's income; total and permanent disability income; hospitalization, surgical, major medical and dental plans; adoption assistance; paid vacations and holidays; company benefits while in military service; tuition refund; a retirement plan and a retirement education assistance plan.

IBM recognizes that it has a responsibility to the communities in which it has facilities and encourages and recognizes employees involved in local community activities. Through its fund for community services, the company provides financial support for a wide range of health, scientific, civic and cultural activities. Through its social service leave program, the company may grant a leave of absence to employees who wish to devote some or all of their time to public service. Through its faculty loan program, it will assist minority or disadvantaged students by lending IBMers to teach at colleges and universities where enrollment is primarily minorities or handicapped persons. Through its job training for the disadvantaged program, IBM may provide equipment, training materials and supplies to community organizations that offer training to people lacking employable skills who cannot afford training through normal commercial outlets. IBM will also match active and retired employees' contributions to approved institutions of higher learning on a two-for-one ratio through its matching grants to education program.

Shown are IBM's main research, development and manufacturing facilities in the United States. IBM also maintains offices in principal cities of the continental United States and in Anchorage, Alaska; Honolulu, Hawaii; and San Juan, Puerto Rico.


Burlington, VT
Cambridge, MA
Kingston, NY
Poughkeepsie, NY
Danbury, CT
East Fishkill, NY
Yorktown Heights, NY
Sterling Forest, NY
Brooklyn, NY
Princeton, NJ
Endicott, NY
Owego, NY
Rochester, MN
Boulder, CO
Palo Alto, CA
San Jose, CA
Santa Teresa, CA
Lexington, KY
Gaithersburg, MD
Manassas, VA
Raleigh, NC
Charlotte, NC
Westlake, CA
Los Angeles, CA
Tucson, AZ
Austin, TX
Houston, TX
Tampa, FL
Boca Raton, FL


Greenock, U.K.
Hursley, U.K.
Havant, U.K.
Amsterdam, Ned.
Uithoorn, Ned.
Essonnes, Fr.
Boigny, Fr.
Bordeaux, Fr.
Montpellier, Fr.
La Gaude, Fr.
Valencia, Sp.
Jarfalla, Sve.
Lidingo, Sve.
Berlin, FRG
Hannover, FRG
Mainz, FRG
Sindelfingen, FRG
Boeblingen, FRG
Vienna, Aust.
Zurich, Switz.
Vimercate, It.
Rome, It.
Bromont, Can.
Don Mills, Can.
Guadalajara, Mex.
Bogota, Col.
Sumare, Bra.
Martinez, Arg.
Fujisawa, Jap.
Yasu, Jap.
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